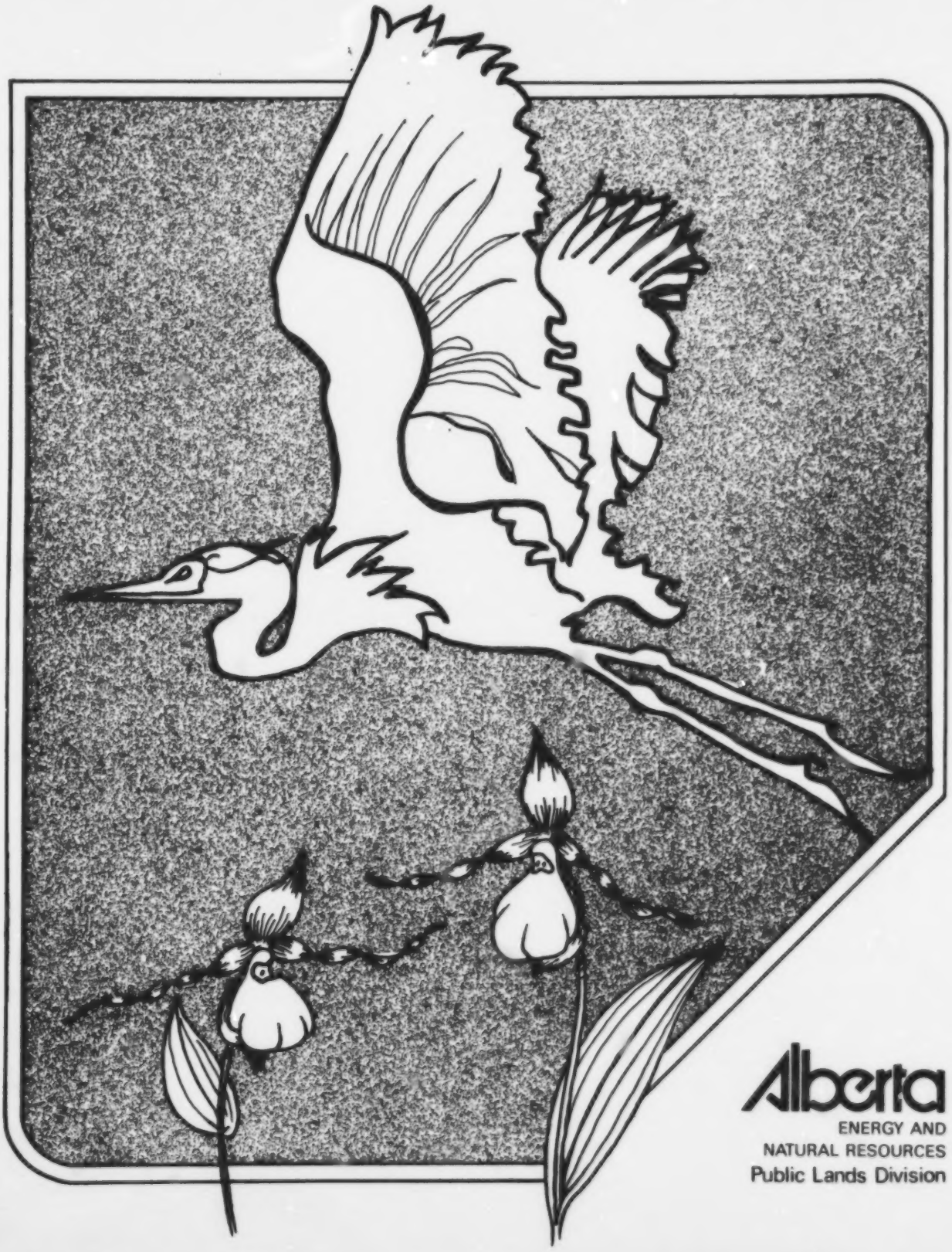
Cameron Hills Biophysical Survey



Alberta
ENERGY AND
NATURAL RESOURCES
Public Lands Division

CAMERON HILLS BIOPHYSICAL SURVEY

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for the
Natural Areas Program

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The views and recommendations expressed in this report are those of the author and not necessarily those of the department.

ABSTRACT

The Cameron Hills Upland is the most northwestern of Alberta's northern plateaus. Little has been written about its biotic communities. This report describes the geology, soils, vegetation and wildlife of an area in the upland selected for brief ground surveys during early August 1982. The upland is discussed in terms of the Alberta Recreation and Parks' Natural Regions classification.

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INTRODUCTION

Alberta Recreation and Parks uses a hierarchical classification of Alberta's landscapes which recognizes six Natural Regions and seventeen Subregions (Alberta Parks 1982). These units are distinguished on the basis of relatively distinct patterns of natural communities. Despite differences in approaches, these map units are similar to those of other ecological region classifications for Alberta (see Moss 1955, Rowe 1972, and Stong and Leggat 1981).

The Cameron Hills Upland (Boreal Forest Natural Region, Sub-arctic Subregion) was selected for study because little was known about the area, hence it could not be knowledgably discussed in terms of the Natural Regions classification. The first step in the study was a search through relevant literature for references to the natural characteristics of the upland. LANDSAT imagery and aerial photographs of the upland were examined in order to ascertain the general pattern of landforms and vegetation cover types, and to identify areas of exceptional diversity or unusual character. A study site was chosen and field studies were conducted by Matt Fairbarns, Cliff Wallis and Cleve Werschler through August 6-11, 1982.

During the field study, vegetation plots varying from 20m x 20m (in forests and woodlands) to 5m x 5m (in herb and dwarf shrub vegetation) were sampled. Slope, aspect, topographic position and relief shape were noted. Cover was estimated for free water, deadfall, mineral soil, litter, ground-dwelling cryptogams, herbs and dwarf shrubs, 0.5-2m (middle) shrubs, 2-5m (tall) shrubs, and

trees (over 5m and single-stemmed). Average canopy height was noted where appropriate. The plot tables show cover values in the following classes: +, under 1%; 1, 1-5%; 2, 6-25%; 3, 26-50%; 4, 51-75%; 5, 76-95%; 6, 96-100% (adapted from Daubenmire 1959). The occurance and habitat preferences of all plants and vertebrates found in the study area were noted.

At the conclusion of this study, a number of photographic transparencies, and a collection of plant specimens from the study area were submitted to the Natural Areas Group of the Public Lands Division, Alberta Department of Energy and Natural Resources.

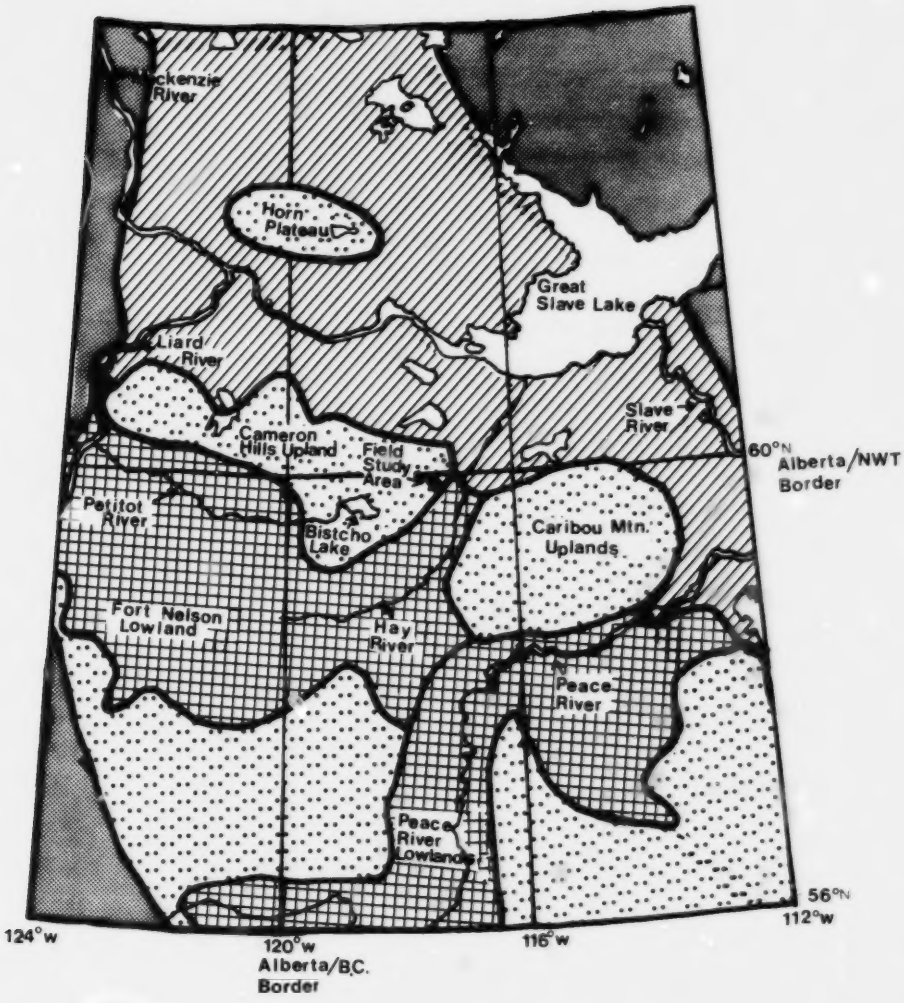

FIGURE 1. PHYSIOGRAPHIC REGIONS

2. GEOLOGY AND SOILS

The Cameron Hills Upland (see map 1) covers parts of northwestern Alberta, northeastern British Columbia and adjacent areas of the Northwest Territories (Pettapiece n.d.). It is one of a ring of flat-topped Cretaceous highlands which form the Alberta Plateau (Geological Survey of Canada map 1254A). These highlands are separated by the Northern Alberta Lowlands (including the Fort Nelson Lowland which borders the southern flank of the Cameron Hills Upland) (Pettapiece n.d.). The Great Slave Plain, underlain by older (Palaeozoic), more calcareous bedrock, borders the northern escarpment of the Cameron Hills Upland (Geological Survey of Canada map 1254A).

As mentioned above, the Cameron Hills Upland is underlain by Cretaceous strata. It differs from related highlands through the absence of an Upper Cretaceous cap, as found in the Caribou Mountain Upland (Geological Survey of Canada map 1250A).

The actual Cameron Hills, where our studies were conducted, are typified by gently rolling to rolling terrain. This is uncharacteristic of the entire Cameron Hills Upland, which consists in general of undulating to depressional terrain with many lakes (Lindsay, Pawluk and Odynsky 1960).

Wisconsin glaciers left a layer of till on the Uplands, primarily in the form of ground moraine. The till has been ice-streamlined to form immense flutings of a scale quite rare in Canada (J. Mollard pers.com.) These flutings indicate two dominant trends of glacial advance in the Uplands: a northwest to southeast curve through what is now Bistcho Lake; and a northeast to southwest curve across the Cameron Hills proper

(Geological Survey of Canada map 1253A). There are scattered meltwater channels in the Upland, however the area was too high to be covered by the great proglacial lakes which left extensive glaciolacustrine deposits in the nearby Fort Nelson Lowland (Geological Survey of Canada map 1253A, Pettapiece n.d.).

Terms Used in Table 1

soil climate	subarctic	-	very cold, widespread permafrost, 120 day growing season
	cryoboreal	-	cold, 120-180 day growing season
soil moisture	subhumid	-	soil in some areas is dry for 90+ consecutive days when temperatures exceed 5°C
within		-	significant moisture deficits the growing season
	humid	-	soil not dry for 90+ consecutive days when temperature exceeds 5°C
within		-	very slight moisture deficits the growing season
	subaquic	-	soil as in humid, but saturated for short periods
	aquic	-	soil as in subaquic, but saturated for moderately long periods
topography	undulating slopes		2-5% slopes
	gently rolling		5-9% slopes
	rolling		9-15% slopes
soil dominance	dominant		over 40% coverage
	subdominant		20-40% coverage
	significant inclusion		10-20% coverage

Table 1. Soil-related Characteristics of Physiographic Regions in Northwestern Alberta (from Clayton et.al. 1977)

	Cameron Hills Upland	Caribou Mountain Upland		Great Slave Plain	Fort Nelson Lowland
		high	low		
parent materials	organic deposits, clayey or loamy weakly calc. till	organic deposits, loamy weakly calc. till with non-calc. residuum	organic deposits, loamy weakly calc. till with non-calc. residuum	clayey, slightly calc. lacustrine, glaciofluvial and beach deposits	clayey, weakly calc. till and lacustrine
topography	undulating plain	undulating plain	rolling plain	undulating plain	undulating to gently rolling lake-modified till
elevation	760-910 m	760-1,070 m	610-760 m	310-670 m	370-610 m
soil climate	subarctic	subarctic	subarctic	subarctic to cryoboreal	subarctic to cryoboreal
soil moisture	humid with aquic inclusions	humid with subaquic inclusions	humid with subaquic inclusions	subhumid to humid with subaquic inclusions	subhumid to humid with subaquic inclusions
dominant	Cryic Fibrisols	Cryic Fibrisols	Cryic Fibrisols	Orthic Gleysols	Orthic Gleysols
subdominant	Orthic Gray Luvisols	Orthic Gray Luvisols	Orthic Gray Luvisols	Cryic Fibrisols Orthic Gray Luvisols	Cryic Fibrisols
significant inclusions	Orthic Gleysols	Orthic Gleysols	Orthic Gleysols	Orthic Eutric Brunisols	

Table 1 summarizes soil-related characteristics of the Cameron Hills upland. Corresponding notes are made for the similar Caribou Mountain Upland, and the two physiographis units which border the Cameron Hills Upland. Of major note are the cooler soil climates (the result of a greater elevation) and higher soil moistures which dominate the two uplands. Together they explain the predominance of Cryic Fibrisols. In contrast, the lowland units are dominated by Orthic Gleysols (which cover less than 20% of the upland units).

Of particular interest is the extent of buried ice found in late summer in the Cryic Fibrisols of the Cameron Hills Upland. In a report on their helicopter survey of soils in the area, Lindsay, Pawluk and Odynsky (1960) mention the frequency with which ice was found at 22-26" (approximately 55-65cm). Seven shallow pits were dug in Cryic Fibrisols during our present survey. Ice was found at roughly 60cm in four of these sites.

No permafrost or permafrost features were found in mineral soil during our survey, although Zoltai and Tarnocai (1974) indicate that "fossil" earth hummocks may occur on silty clay soils of the Cameron Hills Upland. Some mineral soils are certainly unfrozen for only a short period in August and September. These weakly developed soils are only weathered for about 40cm (Lindsay, Pawluk and Odynsky 1960).

3. FLORA AND VEGETATION

3.1 Floristics

Two hundred and thirty-six plant taxa were found in the study area. Fifty-seven of these taxa were non-vascular species (23 lichens, 34 bryophytes). The 176 vascular taxa are split into major life-form and taxonomic groups in Table 3.

Table 2 Vascular Plant Life Forms

	trees	shrubs	perennial herb+dwarf shrubs	annual or perennial	biennial or perennial	annual or biennial		Total
pteridophytes			9					9
gymnosperms	4	1						5
monocots			55					55
dicots	3	25	65	4	2	4	3	106
Total	7	26	129	4	2	4	3	176

The relative proportions of major taxonomic groups is unexceptional for boreal forest environments. The large proportion of perennial taxa reflects the scarcity of annual or biennial "weedy" species, in part due to the scarcity of very recent disturbances (particularly fire) in the study area.

Most of the vascular species are widespread throughout boreal forests in

Alberta. Lycopodium selago, Isoetes muricata, Scheuchzeria palustris, Carex heleonastes, Carex interior, Eriophorum chamissonis and Vaccinium uliginosum are uncommon to rare in Alberta, and their presence indicates cordilleran/subarctic affinities in the study area's flora. The presence of Pinus contorta also reflects a cordilleran influence, while the presence of Pinguicula villosa, Ledum palustre, Myrica gale, Arctagrostis arundinacea and Carex loliacea, which are uncommon to rare in Alberta, reflect obvious subarctic affinities.

3.2 Leading Species

Trees dominated all poorly to well drained soils, except where recent fires or seasonal flooding came into play. Populus tremuloides stands are quite uncommon in the Cameron Hills Uplands except in the study area. Here, perhaps because of stronger relief, they occurred on several medium-textured, moderately well to well drained soils. Populus tremuloides appears to be a pioneer species, for it was quite scarce under all canopy types. It is probably fire-perpetuated, favored by light fires which weaken or eliminate competitors and stimulate suckering. It forms even canopies which rank among the tallest (to 13m) stands of the study area.

Pinus contorta is almost as scarce as Populus tremuloides in the Cameron Hills Upland, but it too was extensive in the study area. It forms stands on coarser, well to very well drained soils. Its regeneration was negligible under all canopy types, and it is also a fire-perpetuated pioneer. It is favored by heavy fires which eliminate competition from Populus tremuloides suckering, although seed availability is also important. Mixed stands of Populus tremuloides and Pinus contorta were occasionally encountered. Pinus contorta generally formed even canopies of moderate (to 11m) height.

Picea mariana is the leading tree in the Cameron Hills, and the study

area in particular. It occurs across almost the entire regime of soil moisture classes, and is particularly abundant on peat. Although it is the first tree to invade wetlands and some upland sites, it is equally important as a successional species following Populus tremuloides and Pinus contorta. In this respect it appears to assume the role Picea glauca plays in the Mixedwood region. In consequence, the post-pioneer canopy of many Picea mariana stands is uneven.

Tall shrubs dominated poorly to well drained sites where disturbance had eliminated tree canopies. Alnus crispa was most prominent at 1-3m in recent burns on imperfectly to well drained soils. Its cover was much lower in nearby forests, and probably drops off rapidly as the canopy is overtopped by the closed canopy of pioneer trees.

Alnus tenuifolia was an important component of tall scrub on riparian sites subject to seasonal flooding. Like Alnus crispa, it persists only at much lower densities after trees overtop and shade its canopy.

Salix planifolia ssp. planifolia grew to 4m in riparian tall scrub where it joined with Alnus tenuifolia to dominate seasonally flooded sites.

Salix scouleriana and S. discolor were not reliably distinguished in the field. These tall willows were frequently found below deciduous canopies or in openings in coniferous canopies. Their successional relationships are unclear, perhaps because of the identification problems.

A number of middle shrub species were found, but nine species or species complexes were particularly important. Salix planifolia ssp. pulchra occurred in many very wet sites, although it was only recorded in one plot. It appears to favor mesotrophic to eutrophic sites, which is in keeping with its characteristics and those of its leading associates as described by Jeglum (1971).

Salix pedicellaris was also a species of very wet sites; however, it appears to favor more oligotrophic sites.

Salix glauca was abundant in a variety of sites. It appears to favor mesic to very wet, mesotrophic to eutrophic mineral soils and peat.

Myrica gale was most frequently found along lakeshores, but it was also abundant in a few upland depressions characterized by very wet conditions and oligotrophic species.

Chamaedaphne calyculata showed site requirements very similar to those of Myrica gale.

Vaccinium uliginosum was a frequent and often abundant species of moist peats in association with oligotrophic to mesotrophic species.

Betula x sargentii (a presumed hybrid of Betula glandulosa and Betula pumila) was most abundant in wet to very wet peats in association with mesotrophic to eutrophic species.

Ledum groenlandicum occurred over a variety of habitats. Taxonomic problems were not evident in well drained to imperfectly drained sites, but in wetter peats introgression with L. decumbens is frequent. The latter species is most clearly expressed in peatland populations.

Viburnum edule is a leading middle shrub species on many upland sites. It was most frequently abundant under deciduous canopies on moderately well drained sites, but occasionally reached high cover values under open coniferous canopies on moderately well drained sites.

The leading individual species of the low shrub/herb stratum were all low shrubs or graminoids. In addition to the 11 species discussed below, a complex of species (e.g. Cornus canadensis, Mertensia paniculata, Pyrola asarifolia, Epilobium angustifolium) were particularly important because together they dominated their stratum in a large number of mesophytic plots.

The low (under 0.5m) shrubs were important across a broader range of habitats. Salix myrtillifolia was restricted to moist peats, while Arctostaphylos uva-ursi and Linnaea borealis were most abundant on moderately well to well drained mineral soils. Empetrum nigrum (moist to moderately well drained), Vaccinium vitis-idaea (well drained to very moist) and Rosa woodsii/acicularis (moist to very well drained) were found on a wide variety of sites.

The leading graminoids occurred in wet, usually peaty sites. Their nutrient preferences varied from oligotrophic (Carex paupercula, C. limosa, Scheuchzeria palustris) to mesotrophic (Arctagrostis arundinacea) and eutrophic (Carex aquatilis, C. rostrata) (Jeglum 1971 and pers.obs.).

The leading cryptogams included 5 species of Sphagnum (S. fuscum, S. fimbriata, S. warnstorfii, S. majus and S. magellanicum) which were not noted frequently enough to generalize individual habitat preferences. The same holds true for Drepanocladus fluitans and Brachythecium (mildeanum?) which were each abundant in one plot. Pleurozium schreberi and Hylocomium splendens were the leading feathermosses, and generally occurred under coniferous-dominated canopies in well drained to imperfectly drained sites. Reindeer lichens (Cladina spp.) were important in moist peats, and to a lesser extent on well to very well drained mineral soils, where Peltigera aphthosa was also a leading species.

Two aquatic species dominated one plot, Nuphar variegatum and Polygonum amphibium. These species prefer eutrophic sites (Jeglum 1971). Other leading aquatics were Equisetum fluviatile (mesotrophic), Sagittaria cuneata (eutrophic) and Sparganium multipedunculatum (apparently eutrophic).

3.3 Physiognomy

Woody species dominated 23 of the 28 sample plots. The wooded stands sampled belonged to 8 physiognomic classes (Table 2). The study area lacked forest canopies over 15m, which is not true of the majority of Alberta's boreal forest. The absence of Open Scrub emphasizes the difference between the non-peaty, early successional, deciduous Closed Scrub and the peaty, more successionally stable, generally coniferous Tall Shrubland.

Table 3 PHYSIOGNOMIC CLASSES OF VEGETATION DOMINATED BY WOODY PLANTS

Tallest Stratum	70-100% Cover	30-70% Cover	10-30% Cover
trees 30m	Tall Closed Forest	Tall Open Forest	Tall Woodland
trees 15-30m	Closed Forest	Open Forest	Woodland
trees 5-15m	Low Closed Forest	Low Open Forest	Low Woodland
shrubs 2m+	Closed Scrub	Open Scrub	Tall Shrubland
shrubs 0-2m	Closed Heath	Open Heath	Low Shrubland

*Those types which are underlined were found in the study area.

(modified from Specht 1972)

3.4 Vegetation Types

The following 8 vegetation types were differentiated on the basis of physiognomy and composition as recorded in plot sheets, field notes and comparison with the classification by Lee, Ellis and Achuff (1983) of the Caribou Mountains.

3.4.1 *Populus tremuloides* Closed Forest

Aspen formed low closed forests on moderate to well drained soils. *Salix bebbiana*, *S. discolor/scouleriana*, *S. glauca* and *Alnus crispa* were frequent in the subcanopy, probably reflecting a succession from closed scrub pioneers. *Picea mariana* was also frequent in the understory, indicating the probable successional path. *Viburnum edule* and *Shepherdia canadensis* were the most frequent leading species of the middle shrub layer, when it was present.

Linnaea borealis, *Cornus canadensis*, *Rosa woodsii/acicularis*, *Epilobium angustifolium* and *Pyrola secunda* were the most constant species in the diverse and extensive low shrub/herb layer. The cryptogam layer was rarely extensive (usually less than 10% cover) and the most abundant species were usually feathermosses growing under patches of conifers or in small canopy openings.

3.4.2 *Pinus contorta* Woodland and Open Forest

Pine was a leading species in several low woodlands and low open forests on well drained soils. *Populus tremuloides* was a frequent associate in the canopy and pine and aspen stands formed a continuum. *Alnus crispa* and *Salix bebbiana* were the most frequent tall shrubs, and the poor regeneration of these species (particularly the former) suggest they are the remnants of earlier closed scrub communites. *Picea mariana* in the

subcanopy and lower strata indicates the probable direction of succession. The middle shrub layer is most extensively developed under more open canopies. Ledum groenlandicum, and occasionally Viburnum edule, are the leading species in such situations. Vaccinium vitis-idaea and Arctostaphylos uva-ursi are the leading species of the low shrub/herb layer. Cornus canadensis, Rosa sp. and other species of the "mesophytic herb group" are frequently present in low numbers. The cryptogam layer is moderate, with Hylocomium splendens and reindeer lichens (Cladina spp.) most prominent.

3.4.3 Picea mariana/Feathermoss Woodland and Open Forest

Black spruce/feathermoss low woodlands and low open forests generally occur on well to imperfectly drained mineral soils. Minor amounts of Salix discolor/scouleriana, Pinus contorta and Populus tremuloides in the canopy suggest paths of succession which lead to these forests. Picea mariana is also the leading species of the tall shrub layer, and is often present throughout the vegetation profile, so these stands can be considered the closest to a "climax" found in the area. The middle shrub stratum is often poorly developed, although Ledum groenlandicum and Betula x sargentii are occasionally prominent. The low shrub/herb layer is quite variable, but in composition it loosely resembles a poorly developed version of the "mesophytic herb group" characteristic of Populus tremuloides woods. Feathermosses always have high cover values (generally 40-75%). Moister phases often have Sphagnum spp. mixed in, while Cladina spp. are an important component of drier plots. The richest flora of the black spruce/feathermoss type usually occurs in riparian sites, where white spruce is a frequent sub-dominant in the canopy.

3.4.4 Picea mariana/Lichen Scrub

Moist peats are generally dominated by black spruce/lichen open scrub. The Picea mariana are usually stunted, and under 2m. Although spruce is a characteristic species in this vegetation type, Ledum spp. are usually dominant. This is the vegetation type in which Ledum introgression is most marked. Other leading low shrubs include Vaccinium uliginosum, Empetrum nigrum and Vaccinium vitis-idaea, but their collective cover value rarely exceeds that of Ledum spp. A characteristic of this type is the relative abundance of a number of lichens, including Cladina mitis, Peltigera aphthosa, Icmadophila ericetorum and several Cladonia species. Sphagnum spp. are invariably present (primarily in hollows) and this vegetation type merges into Picea mariana/Sphagnum Open Heath.

3.4.5 Picea mariana/Sphagnum Open Heath

Wet peats in internal depressions usually support a Picea mariana/Sphagnum open heath. Picea mariana, although characteristic, is never dominant. Ledum spp. dominate (again introgression is a problem) while Rubus chamaemorus, Vaccinium vitis-idaea, Oxycoccus microcarpus and Andromeda polifolia occur frequently with low cover values. The cryptogam layer is invariably dominated by Sphagnum (S. fuscum in the one plot sampled). This is one of the most uniform and floristically simple vegetation types in the study area.

3.4.6. Deciduous Open Heath (Low Shrub Fen)

Low shrub fens occur in very wet depressions. They are generally very wet open heaths dominated by shrubs (Chamaedaphne calyculata, Salix planifolia) with a prominent mixture of sedges (Carex paupercula, C. aquatilis). The open heaths grade into drier closed heaths on thicker

and probably more nutrient-impoverished peats. These closed heaths are dominated by a mixture of shrubs (Salix glauca, Myrica gale, Betula X sargentii, Salix pedicellaris and Ledum groenlandicum) which suggests a transition to the Picea mariana/Sphagnum type.

3.4.7 Sedge Fen - Two Subtypes

Sedge fens occur on lake edges and in very wet internal depressions. The most frequent dominants are Carex rostrata and C. aquatilis, which prefer mesotrophic to eutrophic sites. Occasionally Carex limosa and Scheuchzeria palustris will dominate a very different assemblage of species more closely allied to the Picea mariana/Sphagnum type.

3.4.8 Deciduous Closed Scrub - Two Subtypes

Closed scrub occurs in 2 situations. The Salix planifolia - Alnus tenuifolia/Equisetum type is a riparian assemblage which persists in areas subject to periodic flooding. In contrast, the Salix discolor - Alnus crispa/Vaccinium vitis-idaea type occurs on dry uplands following fire. Both are potentially successional to forests or woodlands in the absence of perturbation (flooding or fire).

4. FAUNA

Table 4 summarizes avifaunal records for the Cameron Hills Upland (see Appendix 2 for a more detailed list of species). Aircraft cancellations postponed the field survey until after the breeding season of most bird species. As a result, few species were singing, and the data for our study area is quite incomplete. To make up for this, bird species reported in literature for the Cameron Hills Upland were also listed.

The large proportion of summer residents is typical of cold-temperate areas. These species tend to be elusive after their breeding, hence June surveys will probably add several species to the list. Year round residents are fairly easy to census at any season, thus very few new species are expected. Winter residents, migrants and wanderers are difficult to comprehensively census in only one survey, and our results are therefore incomplete. The species recorded in literature surveys may not all occur in the field study area. To substantiate records, further field studies are strongly recommended.

Two species of herptiles were also recorded in our studies; Wood Frogs and Chorus Frogs. Early season field work is required before notes on their habitat preferences and abundance can be made.

Observations and spoor surveys revealed nine mammal species in the area. They are: Moose, Black Bear, Snowshoe Hare, Beaver, Red Squirrel, Least Chipmunk, Wolf, Coyote, and an unidentified mustellid (likely Pine Marten). Again, further field studies will undoubtedly add to the list, and also enable conclusions to be made about abundance and habitat preference.

No records were made of fish or invertebrate species in the area.

Table 4 NUMBERS OF BIRD SPECIES RECORDED

Status	A - This Survey	B - Partial A as a % of Total A	C - Literature & This Survey	D - A as a % of C
Year-round Resident	8	13	9	89
Summer Resident	47-48	78-80	84-85	56
Winter Resident	0-1	0-2	0-1	100
Migrant	2-4	3-7	8-10	25-40
Wanderer	1	2	3	33
TOTAL	60	100	106	57

5. REGIONAL CHARACTERISTICS

Rowe (1972) included the Cameron Hills in the Hay River Section, the Caribou Mountains in the Lower Foothills Section and the Birch Mountains in the Mixedwood Section. Alberta Parks (n.d.) group the Cameron Hills along with the Caribou Mountains and Birch Mountains in a distinct "Boreal Sub-arctic Section". Rowe's seminal description of the general characteristics of four sections are reviewed below in order that the affinities of the Cameron Hills can be understood.

The Mixedwood Section uplands have "a mixture in varying proportions of trembling aspen and balsam poplar, white and Alaska birches, white spruce and balsam fir, the last two species especially prominent in old stands. The cover type of greatest aerial extent is the trembling aspen . . ." Pinus banksiana dominates sandy soils and dry tills, and mixes with Picea mariana on the higher hills.

The Hay River Section is "the northern extension of the mixedwood forest . . ." Forest growth is less vigorous, Picea glauca and Populus tremuloides are less extensive and Abies balsamea is absent. Picea mariana is very extensive, both in lowlands and uplands. Pinus banksiana occurs on the eastern side, and Pinus contorta in the west.

The Northwest Transition Section is characterized by peatlands and rock barrens intermixed with park-like Picea mariana and Pinus banksiana stands on upland sites. Picea mariana is the major tree species, while Picea glauca, Betula papyrifera, Larix laricina, Populus tremuloides, P. balsamifera and Pinus banksiana are secondary.

The Lower Foothills Section is distinguished by the dominance of Pinus contorta, Populus tremuloides and P. balsamifera. Picea glauca and P. mariana are found in older stands, while Betula papyrifera, Larix laricina, Abies balsamea and Abies lasiocarpa are minor.

Lee, Ellis and Achuff (1983) have examined the problems of affinity in the similar Caribou Mountains. They point out that while Pinus contorta does occur in the area, it is usually mixed with Picea mariana. The latter is the predominant tree species in the Caribou Mountains. The authors also point out the extensive peatlands with discontinuous permafrost, and peat plateaus. These factors, along with floristic and avifaunal considerations, led the authors to reject the Lower Foothills classification of Rowe. In conclusion, they suggest that the Caribou Mountains should be included in a subarctic section somewhat along the lines of a southwest extension of Rowe's Northwest Transition Section, as discussed earlier. It is unfortunate that this paper did not discuss affinities with the Hay River Section (examination of the association tables shows distinct differences from the Mixedwood Section). This is understandable however, since Rowe's brief description is still the standard published source of information on the Hay River Section.

Our study area was somewhat atypical of the Cameron Hills. Local relief was greater than elsewhere, and some vegetation types (e.g. low Populus tremuloides forests) were over-represented. Nevertheless, a good representation of the characteristic vegetation of the upland was probably achieved.

Of Rowe's types, the Hay River Section fits the Cameron Hills best. Park-like stands on mineral soil (characteristic of the Northwest Transition) are uncommon.

Park-like Picea mariana peaty forests [composed of Picea mariana Open Scrub (type 4) and Open Heath (type 5)] on discontinuous permafrost are very extensive in the Cameron Hills Upland. The extent of these

peatlands is a departure from the apparent character of the Hay River Section. In this respect the terrain of the Cameron Hills seems more similar to that reported for the Caribou Mountains (Lee, Ellis and Achuff 1983). Before a Sub-Arctic Section can be accepted, the Hay River Section must be more clearly characterized for purposes of contrast.

6. DISTURBANCE

The chief human disturbance of the Cameron Hills is the network of seismic lines and hydrocarbon extraction facilities. Large undisturbed tracts (over one township) representative of the upland are scarce. Minor disturbances include fire control operations and fly-in sports fishing at several lakes. Southeast Bistcho Lake is the site of two Indian Reserves.

The study area was transected by several seismic lines. Two log cabins were found, one abandoned and the other new. These were undoubtedly used for trapping.

7. SPECIAL FEATURES

Important areas within the study area include: the diverse aquatic weed beds (special feature 1) which include the uncommon Isoetes muricata (quillwort); a representative aspen forest (special feature 2) with a rich ground cover of mesophytic herbs; and the glacial flutings area (special feature 3) in which the geomorphic significance of these huge flutings is complemented by the rich variety of vegetation.

Other important areas in the Cameron Hills include the delta at the mouth of the Petitot River where it flows into Bistcho Lake, and the "marl" ponds, mixed woods and tall scrub south of the east end of Bistcho Lake.

8. RECOMMENDATIONS

1. Further studies in the Cameron Hills should examine the Petitot River Delta on the north shore of Bistcho Lake, and the area south of Bistcho Lake noted in the "Special Features" section.
2. Further studies in the Cameron Hills should be carried out in the early summer, in order to provide more information on breeding birds (particularly northern species) and early flowering plants.
3. Existing information on the Hay River Section should be analyzed to provide a clearer picture of the Section, and its affinities with the Cameron Hills.
4. Further reconnaissance surveys should be carried out in the Birch Mountains (and possibly the Hay River Section) to complete a first level description of the Hay River and Boreal Subarctic Zones.
5. Recommendations on protected status for the Cameron Hills should be deferred until recommendations 1-4 are met. If this proves impossible, the Caribou Mountains study areas should be given priority over the Cameron Hills study area for the purposes of protection of a characteristic tract of the boreal sub-arctic region.

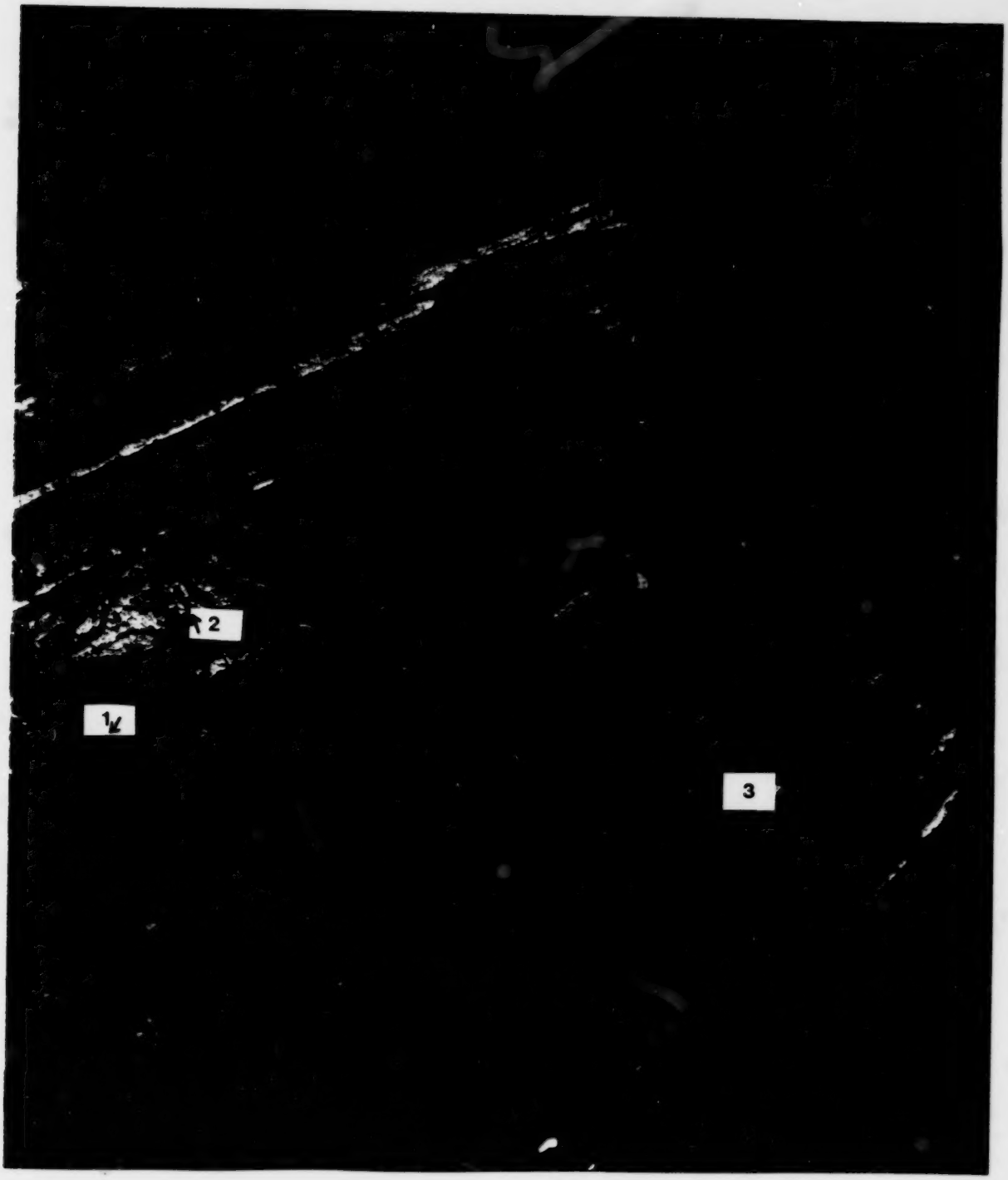

Figure 2. Aerial Photograph of the Study Area.

Special Features: 1. Diverse Aquatic Weedbed

2. Rich Aspen Forest

3. Giant Glacial Flutings

9. SUMMARY

The Cameron Hills Upland is a till-capped, low relief erosion remnant of Pleistocene glaciation. Low sites are dominated by Cryic Fibrisol soils, often with a shallowly buried permafrost layer. Orthic Gray Luvisols dominate the less extensive mineral soils.

The major plant communities are: Low, closed Populus tremuloides/mesophytic herb forests; low, open Pinus contorta/Vaccinium vitis-idaea - Arctostaphylos uva-ursi/feathermoss/reindeer lichen forests; low, open Picea mariana/Ledum groenlandicum/feathermoss - Sphagnum forests; open Picea mariana/Ledum groenlandicum/lichen - Sphagnum scrub; open Picea mariana/Ledum groenlandicum/Sphagnum heath; Salix spp. - Chamaedaphne calyculata/Carex aquatilis - C. pauperculus shrub fens; Carex rostrata - C. aquatilis sedge fens; Carex limosa - Scheuchzeria palustris sedge fens; closed Salix planifolia/Alnus tenuifolia/Equisetum riparian scrub; and closed Salix discolor - Alnus crispa/Vaccinium vitis-idaea fire-regeneration scrub.

Two hundred and thirty-two plant taxa, 106 bird species, 9 mammal species and 2 herptile species have been recorded to date in the Cameron Hills Upland.

The southward range extensions of several plant and animal species into the study area, and the widespread occurence of permafrost support inclusion of the Upland in the Sub-Arctic Section of the Boreal Forest Natural Region. The isolated occurence of aspen forests on top of the upland confirm that southern boreal affinities are also present. A review of studies in the Hay River Section of the Boreal Forest Natural Region is badly needed in order to clarify the distinctions between it and the sub-arctic section. Early and mid-summer field studies are recommended for the Cameron Hills Upland in order to provide a clearer picture of the flora and fauna of the area.

BIBLIOGRAPHY

Argus, G.W. and D. J. White. 1978. The rare vascular plants of Alberta. National Museums of Canada. Syllogeus #17. 47 pp.

Clayton, J.S., W.A. Ehrlich, D.B. Cann, J.H. Day and I.B. Marshall. 1977. Soils of Canada; II Soil Inventory. Canada Department of Agriculture, Res. Branch. 239 pp and map.

Cody, W.J. 1979. Vascular plants of restricted range in the continental Northwest Territories, Canada. National Museums of Canada. Syllogeus #23. 57 pp.

Daubenmire, R.F. 1959. A canopy-coverage method of vegetation analysis. Northwest Science 33:43-64.

Douglas, G.W., G.W. Argus, H.L. Dickson and D.F. Brunton. 1981. The rare vascular plants of the Yukon. National Museums of Canada. Syllogeus #28. 61 pp and maps.

Geological Survey of Canada. Map 1250A. Geological Map of Canada. 1:5,000,000.

Geological Survey of Canada. Map 1253A. Glacial Map of Canada. 1:5,000,000.

Geological Survey of Canada. Map 1254A. Physiographic Regions of Canada. 1:5,000,000.

Jeglum, J.K. 1971. Plant indicators of pH and water levels in peatlands at Candle Lake, Saskatchewan. Can. J. Bot. 49:1661-1676.

Lee, P.G., R.A. Ellis and P.L. Achuff. 1983. Vegetation and flora of the Caribou Mountains, Alberta. Canadian Field - Naturalist 96(4):389-408.

Lindsay, J.P., S. Pawluk and W. Odynsky. 1960. Exploratory soil survey of Alberta. Map sheets 84-M, 84-N and 84-A. Research Council of Alberta. Preliminary Soil Survey Report 61-1. 43 pp.

Moss, E.H. 1955. The vegetation of Alberta. Bot. Rev. 21(9):493-567.

Packer, J.G. and C. Bradley. 1980. A checklist of the rare vascular plants of Alberta with maps. Alberta Department of Recreation, Parks and Wildlife. 467 pp.

Patterson, L.A. and A.N. Wisely. 1977. Aerial surveys of water bird populations along the Fort Simpson realignment of the proposed arctic gas pipeline route, Alberta and Northwest Territories. May - September 1975. (vi and 42 pp).
In: W.W. Gunn, C.E. Tull and T.D. Wright (ed.). Ornithological studies conducted in the area of the proposed gas pipeline route: Northern Alberta, Northwest Territories, Yukon Territory and Alaska. 1975.
Canadian Arctic Gas Study Ltd. Biological Report Series, Vol. XXXV, Ch. V.

Pettapiece, W. n.d. Provisional Physiographic Regions Map of Alberta. Alberta Research Council.

Rowe, J.S. 1972. Forest Regions of Canada. Canada Department of Environment, Canada Forest Service. Publ. #1300. 172 pp.

Salter, R. 1974. Bald eagle surveys in southern Mackenzie District and northern Alberta. July 1973. (v and 26 pp).
In: W.W.H. Gunn, W.J. Richardson, R.E. Schweinsburg and T.D. Wright (ed.). Ornithological studies conducted in the area of the proposed gas pipeline. 1973.
Canadian Arctic Gas Study Ltd. Biological Report Series, Vol. XXVI, Ch. III.

Specht, R.L. 1972. The vegetation of South Australia. South Australia Branch of the British Science Guild Handbooks Committee. 328 pp.

Strong, W.L. and K.R. Leggat. 1981. Ecoregions of Alberta. Alberta Energy and Natural Resources Report #T/4. 64 pp.

Ward, J.G. 1975. Continuing surveys of terrestrial bird populations in the Mackenzie Valley. June 1974. (ix and 93 pp).
In: W.W. Gunn, R.E. Schweinsburg, C.E. Tull and T.D. Wright (ed.). Ornithological studies conducted in the area of the proposed gas pipeline route: Northwest Territories, Yukon Territory and Alaska. 1974.
Canadian Arctic Gas Study Ltd. Biological Report Series, Vol. XXX, Ch. IV.

Wisely, A.N. and C.E. Tull. 1977. Ground surveys of terrestrial breeding bird populations along the Fort Simpson realignment of the proposed arctic gas pipeline route, Alberta and Northwest Territories. June 1975. (vi and 59 pp).
In: W.W. Gunn, C.E. Tull and T.D. Wright (ed.). Ornithological studies conducted in the area of the proposed gas pipeline route: Northern Alberta, Northwest Territories, Yukon Territory and Alaska. 1975.
Canadian Arctic Gas Study Ltd. Biological Report Series, Vol. XXXV, Ch. VI.

Zoltai, S.C. and C. Tarnocai. 1974. Soils and vegetation of hummocky terrain. Government of Canada. Task Force on Northern Oil Development Northern Pipelines. Environmental - Social Committee Report #74-5. 86 pp.

APPENDIX I

Vascular Flora of the Cameron Hills

One hundred and seventy-five vascular plant taxa were found in the Cameron Hills. This appendix lists the species in taxonomic order, noting synonymy where confusion may otherwise obscure the entries. All species are present, and have not been designated rare in Alberta, the Yukon and the Northwest Territories unless specifically noted (Argus & White 1978, Packer & Bradley 1978, Douglas et.al. 1981, Cody 1979). Relevant information regarding rare plants of British Columbia is not available. The frequency and habitat preferences of each taxon are presented.

Equisetaceae

Equisetum arvense L.
A frequent and sometimes leading species in the ground cover of Picea mariana/feathermoss and Pinus contorta - Picea mariana/Vaccinium vitis-idaea communities.

Equisetum fluviatile L.
An occasional dominant in shallow lake waters.

Equisetum scirpoides Michx.
A frequent ground cover species in low coniferous forests and woodlands.

Equisetum sylvaticum L. var. pauciramosum Milde
A frequent ground cover species in moist vegetation including fens, Picea mariana/feathermoss stands and riparian closed scrub.

Equisetum variegatum Schleich.
An occasional ground cover species in open, disturbed areas.

Lycopodiaceae

Lycopodium annotinum L.
An occasional ground cover species in mesic Populus tremuloides forests and Picea mariana/feathermoss woods.

Lycopodium complanatum L.
An occasional ground cover species in a variety of mesic to dry habitats.

Lycopodium selago L.
An occasional ground cover species in dry, disturbed habitats.
Rare in the Yukon.

Isoetaceae

Isoetes muricata Dur. var. braunii (Dur.) Reed
= I. echinospora Dur. var. braunii (Dur. Eng.
= I. echinospora dur. var. muricata (Dur.) Eng.
An occasional bottom-rooting submergent in sand under shallow lake water.
Rare in Alberta, the Yukon and the Northwest Territories.

Pinaceae

Larix laricina (DuRoi) Koch
A frequent, stunted tree in fens and Picea mariana/Sphagnum communities.

Picea glauca (Moench) Voss
An occasional subdominant tree in riparian Picea

mariana/feathermoss stands.

Picea mariana (Mill.) BSP.
The leading tree in the study area, dominating on many well to poorly drained mineral soils and peats.

Pinus contorta Loud var. latifolia Engelm.
= P. divaricata (Ait.) Dumont var. latifolia (Eng.) Boivin
Dominates (often with Picea mariana) forest canopies on many well drained sites.
Rare in the Northwest Territories.

Cupressaceae

Juniperus communis L.
An infrequent medium or low shrub in well drained sites.

Sparganiaceae

Sparganium angustifolium Michx.
A frequent floating-leaved species in shallow, eutrophic lake waters.

Sparganium multipedunculatum (Morong) Rydb.
A frequent leading floating-leaved species in shallow, eutrophic lake waters.

Potamogetonaceae

Potamogeton filiformis Pers.
An occasional leading submergent in quiet, shallow, eutrophic lake waters.

Potamogeton freisii (Rupr.)
An occasional leading submergent in quiet, shallow, eutrophic lake waters.

Potamogeton praelongus Wulfen
An occasional leading species in quiet, mesotrophic lake waters.

Potamogeton richardsonii (Benn.) Rydb.
= P. perforiatus L. var. richardsonii Benn.
An occasional species in quiet, mesotrophic lake waters.

Scheuchzeriaceae

Scheuchzeria palustris L. var. americana Fern.
An occasional leading species in shallow, oligotrophic fens.
Rare in the Yukon and the Northwest Territories.

Juncaginaceae

Triglochin maritima L.
An occasional species in fens.

Triglochin palustris L.
An occasional species in fens.

Alismaceae

Sagittaria cuneata Sheld.
= S. cuneata Raf.
A frequent leading floating-leaved species in quiet, shallow lake waters.
Rare in the Yukon and the Northwest Territories.

Poaceae

Festuceae

Festuca saximontana Rydb.
= F. ovina L. var. saximontana (Rydb.) Gl.
An occasional species in dry, disturbed habitats.

Glyceria pulchella (Nash) K. Schum.
Occasional in mesotrophic fens.

Poa palustris L.
Frequent in moist, disturbed areas.

Poa pratensis L.
Occasional in mesic to dry, disturbed areas.

Aveneae

Trisetum spicatum (L.) Richt.
Occasional in mesic, disturbed areas.

Agrostideae

Agrostis scabra Willd.
A. hyemalis (Walt.) BSP. var. tenuis (Tuck.) Gl.
Frequent in open, moist (often disturbed) areas.

Arctogrostis arundinacea (Trin.) Beal var. arundinacea
= A. latifolia (R.Br.) Griseb. var. arundinacea (Trin.) Griseb.
Frequent and occasionally abundant in moist Picea mariana forests and peatlands.

Calamagrostis canadensis (Michx.) Beauv. var. canadensis
Occasional in riparian closed scrub, fens and Picea mariana/Sphagnum vegetation.

Calamagrostis inexpansa A. Gray
Occasional in peatlands, particularly shrubby fens.

Calamagrostis neglecta (Ehrh.) Gaertn., Mey. and Schreb.
Occasional in moist Picea mariana/feathermoss communities and closed riparian scrub.

Oryzopsis pungens (Torr.) Hitchc.
Occasional in dry, open Pinus contorta woods and disturbed areas.
Rare in the Yukon.

Hordeae

Agropyron caninum (L.) Beauv. ssp. majus (Vasey) Hitchc. var. majus (Link.) Malte
= A. trachycaulum (Link.) Malte
Frequent in Populus tremuloides and Picea mariana/feathermoss forests.

Agropyron caninum (L.) Beauv. ssp. majus (Vasey) Hitchc. var. unilaterale (Vasey) Hitchc.
= A. trachycaulum (Link.) Malte var. unilaterate (Cassidy) Malte
Frequent in Populus tremuloides and Picea mariana/feathermoss forests.

Elymus innovatus Beal
Occasional in Populus tremuloides and Pinus contorta woodlands, and even less frequent on peat hummocks in Picea mariana/Sphagnum bogs.

Cyperaceae

Carex

Dioicae

Carex gynocrates Wormsk.
Frequent in Picea mariana/feathermoss and Picea mariana/Sphagnum communities.

Paniculatae

Carex diandra Schrank.
Occasional in sedge fens.

Heleonastes

Carex brunnescens (Pers.) Poir.
Frequent in open, moist (often disturbed) areas.

Carex canescens L.
= C. curta Good. var. curta
Occasional in open sedge fens.

Carex disperma Dewey
Frequent in fens.

Carex heleonastes Ehrh.
Occasional in eutrophic fens.

Carex loliacea L.f.
Occasional in sedge fens.
Rare in the Northwest Territories.

Carex tenuiflora Wahlenb.
Occasional in fens.

Stellulatae

Carex interior Bailey
Occasional in fens.

Ovales

Carex praticola Rydb.
= C. petasata Dewey var. minor (Boott.) Boivin
Frequent in moist to dry, open (often disturbed) areas.

Polytrichoidea

Carex leptalea Wahlenb.
Frequent in sedge fens and wet Picea mariana/Sphagnum communities.

Bicolores

Carex garberi Fern.
Occasional in open, wet areas.

Paniceae

Carex vaginata Tausch
Occasional in Picea mariana/feathermoss woods.

Capillares

Carex capillaris L. ssp. chlorostachys (Steven) Love, Love & Raymond
Occasional in moist woods.

Limosae

Carex limosa L.
Occasional, but sometimes dominant, in oligotrophic fens.

Carex paupercula Michx.
Occasional, but sometimes dominant, in oligotrophic fens.

Acutae

Carex aquatilis Wahlenb. var. aquatilis
Frequent dominant in sedge fens.

Vesicariae

Carex rostrata Stokes
Frequent dominant in sedge fens.

Eleocharis palustris (L.) R.&S.
Occasional dominant on very wet mud, muck and thin peat.

Eriophorum angustifolium Honckeny
= E. polystachion L.
Occasional in sedge fens.

Eriophorum brachyantherum Trautv.
Occasional in sedge fens.

Eriophorum chamissonis Mey.
= E. russeolum Fries
Occasional of sedge fens.

Eriophorum gracile Koch
Occasional of sedge fens.
Rare in the Northwest Territories.

Scirpus hudsonianus (Michx.) Fern.
Frequent dominant in transition zone from sedge fens to Picea mariana/Sphagnum bogs.

Lemnaceae

Lemna trisulca L.
Occasional dominant in quiet, shallow water.

Juncaceae

Luzula campestris (L.) DC. var. frigida Buch.
= L. multiflora (Retz.) Lej. ssp. frigida (Buch.) Krecz. var. contracta Sam.
Occasional in moist, disturbed sites.

Luzula parviflora (Ehrh.) Desv.
Occasional in moist, disturbed sites.

Liliaceae

Smilacina trifolia (L.) Desf.
Occasional between Picea mariana/Sphagnum bogs and closed riparian scrub.
Rare in the Yukon.

Orchidaceae

Habenaria hyperborea (L.) R.Br.
Occasional in open, moist areas.

Orchis rotundifolia Banks
Uncommon in Picea mariana/Sphagnum bogs.

Spiranthes romanzoffiana Cham.
Occasional in species-rich Picea mariana/Sphagnum bogs.

Salicaceae

Populus balsamifera L. var. balsamifera
Occasional, and sometimes dominant in riparian forests.

Populus tremuloides Michx.
Frequent, and often dominant on mesic mineral soils.

Salix glauca L. var. glauca
= S. desertorum Rich.
= S. glaucops Andersson
Frequent in Picea mariana and closed scrub communities.

Salix myrtillifolia Andersson
Frequent, and occasionally dominant in the low shrub stratum of Picea mariana/Sphagnum communities.

Salix pedicellaris Pursh var. hypoglauca Fern.
= S. pedicellaris Pursh var. pedicellaris (sensu Boivin)
= S. myrtilloides L. ssp. pedicellaris (Pursh) Anderss.
Frequent in sedge fens.

Salix pyrifolia Andersson
= S. balsamifera Barratt ex Andersson
Occasional minor species in drier sedge fens.
Rare in the Yukon.

Myricaceae

Myrica gale L.
Frequent dominant on lakeshores and in oligotrophic shrub fens.

Betulaceae

Alnus crispa (Aiton) Pursh
= A. viridis (Chaix) DC. var. sinuata Regel
= A. sinuata (Regel) Rydb.
Frequent dominant after fire and minor component in dry to mesic forests.

Alnus tenuifolia Nutt.
= A. incana (L.) Moench ssp. tenuifolia (Nutt.) Breitung
= A. rugosa (DuRoi) Sprengel var. occidentalis (Dippel) Hitchc.
Frequent dominant in riparian closed scrub.

Betula glandulifera (Regel) Gleason
= B. nana L. var. glandulifera (Regel) Boivin
= B. pumila L. var. glandulifera Regel
= B. glandulosa Michx. var. glandulifera (Regel) Gleason
Frequent, and often dominant in Picea mariana/Sphagnum bogs and shrub fens.
Strong introgresses with the next taxon.

Betula glandulosa Michx.
= B. nana L. var. sibirica Led.
In habitats similar to those of the previous taxon, into which it imperceptably grades.

Betula occidentalis Hooker var. occidentalis
= B. fontinalis Sarg.
Very uncommon along moist forest sedges.

Betula papyrifera Marsh. var. commutata (Regel) Fern.
Occasional in riparian forests.

Santalaceae

Comandra livida Rich.
= Geocaulon lividum (Rich.) Fern.
Occasional in Pinus contorta woods and Picea mariana/Cladina bogs.

Polygonaceae

Polygonum amphibium L. var. amphibium
= P. amphibium var. stipulaceum (Coleman) Fern.
= P. natans (Michx.) Eat.
Frequent dominant in shallow water.

Caryophyllaceae

Stellaria crassifolia Ehrh.
Occasional in closed riparian scrub and fens.

Stellaria longifolia Muhl.
Occasional in fens and disturbed, wet, open areas.

Stellaria longipes Goldie
Occasional in open, disturbed areas.

Nymphaeaceae

Nuphar variegatum Eng.
Frequent, and often dominant in shallow, open water.
Rare in the Yukon.

Ranunculaceae

Actaea rubra (Aiton) Willd.
Occasional in Populus tremuloides woods.

Aquilegia brevistyla Hooker
Occasional in Populus tremuloides and Picea/feathermoss woods.

Caltha natans Pallas
Occasional in mucky pools.
Rare in the Yukon and Northwest Territories.

Delphinium brownii Rydb.
= D. glaucum S. Wats.
Occasional in mesic to moist, open, species-rich bogs.

Ranunculus aquatilis L. var. capillaceus (Thuill.) DC.
= R. aquatilis L. var. subrigidus (Drew) Breitung
Occasional in quiet, shallow water.
Rare in the Yukon.

Ranunculus lapponicus L.
Occasional in bogs.

Ranunculus macounii Britton var. macounii
Occasional along moist margin of small pools.

Thalictrum sparsiflorum Turcz. var. richardsonii (Gray) Boivin
Occasional in open, moist areas.
Rare in the Northwest Territories.

Brassicaceae

Arabis hirsuta (L.) Scop. var. hirsuta
= A. hirsuta (L.) Scop. var. pycnocarpa (Hopkins) Rollins
Occasional in open woods.

Rorripa islandica (Oeder) Borbas
Occasional in open, moist, mucky edge of pools.

Droseraceae

Drosera rotundifolia L. var. rotundifolia
Frequent in open peatlands.

Saxifragaceae

Chrysosplenium tetandrum (Lund) Fries
= C. alternifolium L. var. tetandrum Lund
= C. iowense Rydb.
Occasional in moist, open areas.

Mitella nuda L.
Frequent in moist, often peaty areas.
Rare in the Yukon.

Parnassia palustris L.
= P. palustris L. var. neogaea Fern.
Occasional in open, moist (often disturbed) areas.

Grossulariaceae

Ribes glandulosum Grauer
Occasional in swamps.

Ribes hudsonianum Richards.
Occasional in swamps.

Ribes lacustre (Pers.) Poir.
Frequent in moist to mesic woods.

Ribes oxyacanthoides L. var. oxyacanthoides
Occasional in moist woods.

Ribes triste Pall.
= R. rubrum L.
Occasional in moist woods.

Rosaceae

Pomeae

Amelanchier alnifolia Nutt.
Occasional in open Populus tremuloides communities.

Rubeae

Rubus acaulis Michx.
= R. arcticus L. var. acaulis (Michx.) Boivin
Frequent in Picea mariana communities.

Rubus chamaemorus L.
Frequent in Sphagnum-dominated ground layers.

Rubus pubescens Raf. var. pubescens
Frequent in mesic and wet-mesic communities.
Rare in the Yukon.

Rubus strigosus Michx.
= R. idaeus L. var. aculeatissimus Regel & Tiling
= R. idaeus L. var. strigosus (Michx.) Maxim
Occasional in Populus-dominated communities.

Potentilleae

Fragaria virginiana Duschesne
= F. virginiana Duschesne var. glauca S. Wats.
= F. glauca (Watson) Rydb.
= F. glauca Duschesne ssp. glauca
Frequent in mesic to wet-mesic communities.

Geum allepicum Jacq.
= G. allepicum Jacq. var. strictum (Ait.) Fern.
Occasional in moist, open areas.
Rare in the Yukon and Northwest Territories.

Geum perincisum Rydb. var. perincisum
= G. macrophyllum Willd. var. perincisum (Rydb.) Raup
Occasional in moist, open areas.

Potentilla fruticosa L.
Frequent in drier, open peatlands.

Potentilla norvegica L.
= P. norvegica L. var. norvegica
Occasional in mesic, disturbed, open areas.

Potentilla palustris (L.) Scop.
Frequent in peatlands and marshes.

Roseae

Rosa acicularis Lindley
Probable identity of roses frequent in open, mesic to moist areas.

Fabaceae

Astragalus alpinus L. var. alpinus
Occasional in dry, open (often disturbed) areas.

Astragalus americanus (Hooker) M.E. Jones
= A. frigidus (L.) A. Gray var. americanus (Hook.) S. Wats.
Occasional in open, moist woods.
Rare in the Northwest Territories.

Lathyrus ochroleucus Hooker
Occasional in mesic Populus-dominated woods.
Rare in the Northwest Territories.

Callitrichaceae

Callitriche hermaphroditica L.
Occasional in quiet water.

Empetraceae

Empetrum nigrum L. var. purpureum (Raf.) DC.
= E. nigrum L. ssp. hermaphroditum (Lge.) Bocher
Frequent in open coniferous forests and peatlands.

Violaceae

Viola renifolia A. Gray var. brainerdii (Greene) Fern.
Very infrequent in moist forests.

Elaeagnaceae

Shepherdia canadensis (L.) Nutt.
Frequent in dry woods.

Onagraceae

Circaea alpina L.
Found once in wet Populus balsamifera woods by the edge of a cobble-lined stream.

Epilobium angustifolium L.
Frequent in open, dry to wet-mesic areas, including drier peatlands.

Epilobium palustre L. var. palustre
Occasional in moist bogs.

Apiaceae

Cicuta bulbifera L.
Occasional in reedswamps.

Cicuta maculata L. var. angustifolia Hooker
Occasional in reedswamps.
Rare in the Yukon and Northwest Territories.

Sium suave Walter
Occasional in reedswamps.

Halagoridaceae

Myriophyllum spicatum L.
= M. exalbescens Fernald
Frequent in quiet water.

Hippuridaceae

Hippuris vulgaris L.
Occasional in mud and shallow waters.

Cornaceae

Cornus canadensis L. var. canadensis
Frequent in forests and woodlands.

Ericaceae

Andromeda polifolia L. var. polifolia
Frequent in Sphagnum bogs.

Arctostaphylos rubra (Rehder & Wilson) Fernald
= A. alpina (L.) Sprengel var. rubra (Rehder & Wilson) Beam
Occasional in open areas.

Arctostaphylos uva-ursi (L.) Sprengel
Frequent (sometimes dominant) in woodland and open area.

Chamaedaphne calyculata (L.) Moench.
Occasional in poor fens.

Kalmia polifolia Wang. var. microphylla (Hooker) Rehder
Frequent in peatlands.

Ledum palustre L. var. latifolium (Jacq.) Michx.
= L. groenlandicum Oeder
= L. palustre L. var. latifolium (Ait.) Mich.
Frequent (often dominant) in medium shrub layer of moist forests and peatlands.
Introgression with the following taxon is pronounced.

Ledum palustre L. var. decumbens Aiton
= L. decumbens (Ait.) Lodd.
Frequent in peatlands and on wet cutlines.

Vaccinium oxycoccus L. var. microphyllum (Lange) Rouss. & Raym.
= Oxycoccus microcarpus Turcz.
Frequent in Sphagnum bogs and moist, mossy woods.

Vaccinium uliginosum L. var. uliginosum
Frequent (often dominant) in medium shrub layer of drier peatlands.

Vaccinium vitis-idaea L. var. minus Lodd.
Frequent (often dominant) in dwarf shrub stratum of dry woodlands and drier bogs.

Pyrolaceae

Moneses uniflora (L.) Gray
= Pyrola uniflora L.
Occasional in mesic coniferous forests.

Pyrola asarifolia Michx.
Occasional in mesic woods.

Pyrola secunda L.
= P. secunda L. var. secunda
Occasional in mesic woods.

Pyrola virens Schweigger
= P. chlorantha Sw.
Occasional in moist woods.

Primulaceae

Lysimachia thyrsiflora L.
Occasional in shallow water.

Gentianaceae

Gentiana amarella (L.) Borner
Occasional on open, dry to mesic cutlines.

Menyanthes trifoliata L.
Occasional in fens.

Boraginaceae

Mertensia paniculata (Ait.) G. Don
Frequent in mesic woods.

Labiatae

Scutellaria galericulata L.
= S. epilobiifolia Hamilton
= S. galericulata L. var. pubescens Bentham
Occasional in moist, open areas, particularly shores.
Rare in the Yukon.

Scrophulariaceae

Castilleja raupii Pennell
Occasional in open areas, particularly on cutlines.

Pedicularis labradorica Wirsing
Occasional in drier peatlands.

Lentibulariaceae

Pinguicula villosa L.
Frequent in Sphagnum hummocks in bogs.
Rare in Alberta.

Utricularia vulgaris L. var. americana A. Gray
Occasional in quiet, shallow water.

Rubiaceae

Galium boreale L.
Frequent in mesic forests.

Galium trifidum L.
Occasional in sedge fens and marshes.

Caprifoliaceae

Linnaea borealis L. var. longiflora Torrey
= L. borealis L. var. americana (Forbes) Rehd.
Frequent (occasionally codominant) in the herb/dwarf shrub layer of mesic to moist woods.

Viburnum edule (Michx.) Raf.
Frequent (occasional dominant) in medium shrub layer of mesic to moist woods.

Asteraceae

Anthemideae

Achillaea millefolium L. var. nigrescens E. Meyer
= A. millefolium L. var. borealis (Bong.) Farw.
= A. nigrescens (E. Meyer) Rydb.
Occasional in moist, open areas.

Astereae

Erigeron acris L. var. asteroides (Andrz.) DC.
Occasional in moist coniferous woods.

Erigeron acris L. var. elatus (Hook.) Cronq.
= E. elatus (Hooker) Greene
Occasional in open, moist areas.

Solidago spathulata DC. var. spathulata
= S. decumbens Greene var. oreophila (Rydb.) Fern.
Occasional in open, mesic to dry areas.

Cichorieae

Hieracium umbellatum L.
= H. scabriusculum Schwein
= H. canadense Michx.
Found once, in a wet clearing.
Rare in the Yukon.

Inuleae

Antennaria neglecta Greene
= A. neodioica Greene
= A. nitida Greene
Occasional in dry, open woods.

Senecioneae

Arnica lonchophylla Greene var. lonchophylla
Occasional in moist, open areas.

Petasites palmatus (Aiton) Gray var. palmatus
Frequent in moist woods.

Petasites sagittatus (Pursh) Gray
= P. sagittatus (Banks) Gray
Frequent in moist to wet, open areas.

Senecio congestus (R.Br.) DC.
Occasional, on edge of marshes.

Senecio indecorus Greene
Occasional, in moist open areas.

Senecio lugens Richards.
= S. integerrimus Nutt. var. lugens (Richardson) Boivin
Occasional in open areas.

Senecio pauperculus Michx.
Occasional in open, moist areas.

APPENDIX II

Non-Vascular Flora of the Cameron Hills

Lichens:

Bryoria fuscescens
Cetraria nivalis
C. pinastri
Cladina mitis
C. rangiferina
Cladonia amaurocraea
C. cenotea
C. coccifera
C. cornuta
C. cristata
C. deformis
C. gracilis
C. multiformis
Evernia mesomorpha
Hypogymnia physodes
Icmadophila ericetorum
Parmelia sp.
Parmeliopsis ambigua
Peltigera aphthosa
P. malacea
Stereocaulon tomentosa
Usnea hirta
U. subfloriana

Bryophytes:

Aulacomnium palustre
Brachythecium (mildeanum?)
B. nelsonii
Calliergon giganteum
C. straminium
Ceratodon purpurea
Dicranum undulatum
D. fuscescens
Drepanocladus fluitans
D. tundreae
D. uncinatus
D. vernicosus
Fontinalis durae
Hylocomium splendens
Lophozia sp.
Mylia anomala
Plagiomnium ellipticum
P. cuspidatum
Pleurozium schreberi
Pohlia nutans
Polytrichum juniperinum

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D. tundreae
D. uncinatus
D. vernicosus
Fontinalis durae
Hylocomium splendens
Lophozia sp.
Mylia anomala
Plagiomnium ellipticum
P. cuspidatum
Pleurozium schreberi
Pohlia nutans
Polytrichum juniperinum

P. piliferum
P. strictum
Ptilidium ciliare
P. pulcherrimum
Ptilium crista-castrensis
Sphagnum angustifolium
S. fimbriatum
S. fuscum
S. magellanicum
S. majus
S. riparium
S. warnstorfii
Tomenthypnum nitens

APPENDIX III

Annotated Checklist of Birds

This list includes species recorded in our survey (underlined) and in other surveys in the Cameron Hills Upland. The following are noted where applicable:

- general habitat of species in the region;
- probable status in study area; and
- breeding records and general notes.

Three references were used in compiling this list:

1. Ward (1975)
   - studied terrestrial birds along transects in the northern Cameron Hills Upland, as well as part of a larger study.

2. Wiseley and Tull (1977)
   - studied terrestrial birds on transects through the Cameron Hills Upland, as well as elsewhere along the Fort Simpson re-alignment of the proposed Arctic Gas pipeline route.

3. Patterson and Wiseley (1977)
   - conducted aerial surveys of water birds in the Cameron Hills Upland and elsewhere along the Fort Simpson re-alignment.

Species recorded in the Cameron Hills Upland by Ward (1975) and Wiseley and Tull (1977) are marked by superscripts (a) and (b) respectively.

Species reported in the Upland by Patterson and Wiseley (1977) are generally disregarded, because of the chance of misidentification during aerial surveys. Species they report which are not mentioned in the previous two studies, and were not found in our field survey, are marked with a superscript (c).

Breeding season surveys in our study area are sure to find many species mentioned only by the other authors, and are likely to produce further species not yet recorded for the Cameron Hills Upland.

Common Loon[a,b]	- lakes - summer resident
Red-throated Loon	- lakes - summer resident - resident in area throughout the period of our survey
Red-necked Grebe[a,b]	- lakes and marshes - summer resident
Horned Grebe[b]	- lakes and marshes - local summer resident in region
Canada Goose[c]	- lakes - spring migrant in region
Mallard[b]	- wetlands and lakes - summer resident
Black Duck[b]	- lakes - occasionally wanders into region
Pintail[c]	- lakes and marshes - scarce summer resident
American Wigeon[b]	- lakes and marshes - summer resident
Green-winged Teal[b]	- lakes and marshes - summer resident
Canvasback[c]	- lakes and marshes - scarce summer resident
Lesser Scaup[a,b]	- lakes - summer resident - several Scaup were seen in our survey, but poor viewing conditions prevented conclusive identification to species (may have been Greater Scaup)
Common Goldeneye[b]	- lakes - summer resident
Barrow's Goldeneye[b]	- lakes - occasionally wanders into region

Bufflehead[a,b]	- lakes - summer resident
Oldsquaw[b]	- lakes - spring migrant
White-winged Scoter[a,b]	- large lakes - summer resident
Surf Scoter[a,b]	- large lakes - migrant
Red-breasted Merganser[b]	- large lakes - migrant
Hooded Merganser	- lakes - wanderer
Goshawk[a]	- coniferous-dominated forests - summer resident
Sharp-shinned Hawk[a]	- mixed forests, particularly near open areas - summer resident
Marsh Hawk[a]	- open wetlands - summer resident
Bald Eagle	- near lakes - summer resident - Salter (1974) reports on a survey of Bald Eagles nesting in the Cameron Hills Upland. The survey found four active nest sites on Bistcho Lake. The area chosen for field surveys in our study was not surveyed by Salter. He describes the Cameron Hills Upland population as relatively abundant.
Osprey[b]	- rivers and lakes - summer resident
Merlin	- a small falcon, tentatively identified as a merlin, was observed hunting in an open peatland near a cutline during our survey
Kestrel	- the alternative, if the preceding observation was not of a merlin
Spruce Grouse[a,b]	- coniferous forests and heavily-wooded muskegs - year-round resident

Ruffed Grouse[b]	- mixed and deciduous woods - year-round resident
American Bittern[a,b]	- lakes and marshes - summer resident
Sandhill Crane[a,b]	- wetlands, particularly marshes - summer resident
Sora[a]	- marshes and open fens - summer resident
American Coot[c]	- lakes and marshes - summer resident
Solitary Sandpiper[a]	- open muskegs and small marshes - summer resident
Spotted Sandpiper[a,b]	- rivers, streams and lakeshores - summer resident
Greater Yellowlegs[b]	- marshes, fens and open bogs - summer resident
Lesser Yellowlegs[a,b]	- open bogs and other wetlands - summer resident
Long-billed Dowitcher	- rivers and lakeshores - uncommon migrant
Semipalmated Sandpiper	- rivers and lakes - migrant
Common Snipe[a]	- marshes and bogs - summer resident
Herring Gull[b]	- lakes and rivers - summer resident
Mew Gull[a]	- lakes and rivers - migrant
Bonaparte's Gull[a,b]	- lakes and treed muskeg - summer resident
Great Horned Owl[a,b]	- mixed forest - year-round resident
Common Nighthawk[b]	- dry, open woods - summer resident
Belted Kingfisher[b]	- lakes and rivers - summer resident

Northern Flicker[a,b]	- mature, mixed forest - summer resident
Yellow-bellied Sapsucker[a]	- mature, mixed forest - summer resident
Hairy Woodpecker[b]	- mature, deciduous-dominated forest - summer resident
Northern Three-toed Woodpecker[a]	- mature, coniferous-dominated forest - year-round resident
Alder Flycatcher[b]	- shrubs along rivers and in wetlands - summer resident
Least Flycatcher[a,b]	- deciduous trees and shrubs in forests and along edges - summer resident
Western Wood Pewee[a]	- coniferous-dominated forests - summer resident
Olive-sided Flycatcher[a]	- coniferous-dominated forests - summer resident
Cliff Swallow[a]	- banks along rivers and streams - summer resident
Tree Swallow[a,b]	- forests by rivers and lakes - summer resident
Bank Swallow[a,b]	- banks by rivers and lakes - summer resident
Gray Jay[a,b]	- coniferous-dominated forests - year-round resident
Common Raven[a,b]	- mature forests - year-round resident
Black-capped Chickadee	- deciduous and mixed forests - year-round resident
Boreal Chickadee[a,b]	- coniferous-dominated forests - year-round resident
American Robin[a,b]	- tall deciduous shrubs - summer resident
Hermit Thrush[a,b]	- forests - summer resident

Swainson's Thrush[a,b]	- shrubs in forests - summer resident
Gray-cheeked Thrush[a]	- migrant
Golden-crowned Kinglet	- coniferous forests - summer resident? or migrant
Ruby-crowned Kinglet[a,b]	- spruce-dominated forests - summer resident
Bohemian Waxwing[a,b]	- mixed or coniferous forests near water or wetlands - summer resident
Solitary Vireo[a]	- coniferous and mixed forests - summer resident
Red-eyed Vireo[a,b]	- deciduous and mixed forests - summer resident
Warbling Vireo[a,b]	- open deciduous and mixed forests - summer resident
Black-and-White Warbler	- deciduous and mixed forests and tall shrubs - summer resident
Tennessee Warbler[a,b]	- deciduous and mixed forests and tall shrubs - summer resident
Orange-crowned Warbler[a,b]	- mixed forests and shrubs - summer resident
Yellow Warbler[a]	- deciduous forests and scrub along rivers and lakes - summer resident
Magnolia Warbler[b]	- mixed forests - summer resident
Yellow-rumped Warbler[a,b]	- coniferous and mixed woods - summer resident
Blackpoll Warbler[a,b]	- shrub-rich coniferous or mixed woods or thickets - summer resident
Palm Warbler[a,b]	- low black spruce bog and woodland - summer resident
Ovenbird[b]	- deciduous and mixed forests - summer resident

Northern Waterthrush	- deciduous or mixed forests and thickets near water - summer resident
Common Yellowthroat[a,b]	- wet deciduous thickets near water - summer resident
Wilson's Warbler[b]	- wet deciduous shrub fens and bogs - summer resident
Canada Warbler	- tall, shrub-rich deciduous or mixed forest - summer resident
American Redstart[a]	- open deciduous forest and scrub, particularly near edges - summer resident
Red-winged Blackbird[a,b]	- tall, open willows or marsh and lake edges - summer resident
Rusty Blackbird[a,b]	- wet scrub, particularly near lakes - summer resident
Brown-headed Cowbird[a]	- open areas, generally riparian or disturbed - summer resident - parasitic, habitat described is not necessarily breeding habitat
Western Tanager[a]	- mature mixed forests - summer resident
Rose-breasted Grosbeak[a]	- shrub-rich deciduous or mixed forest - summer resident
Purple Finch	- open mixed forests, particularly along edges - summer resident
Common Redpoll[a]	- open areas - winter resident or migrant
Pine Siskin[a,b]	- mature, coniferous-dominated forests - summer resident
White-winged Crossbill[a,b]	- mature, coniferous-dominated forests - year-round resident
Savannah Sparrow[b]	- moist, open wetlands - summer resident

Le Conte's Sparrow[a]	- low shrub-sedge fens - summer resident
Sharp-tailed Sparrow[b]	- shrubby fens - summer resident
Dark-eyed Junco	- mixed and coniferous forests - summer resident
Tree Sparrow	- deciduous shrub-rich peatlands - summer resident - an adult feeding immatures near one of our plots was apparently the first breeding record for Alberta (C. Wershler)
Chipping Sparrow[a,b]	- mixed and deciduous forests and treed muskeg - summer resident
Clay-colored Sparrow[a]	- deciduous scrub, particularly where wet - summer resident
White-crowned Sparrow[a,b]	- scrub in open areas - summer resident
White-throated Sparrow[a,b]	- shrubby forests and scrub - summer resident
Fox Sparrow[a,b]	- shrubs, particularly near water or forests - summer resident
Lincoln's Sparrow[a,b]	- wet areas with deciduous shrubs - summer resident
Swamp Sparrow[a,b]	- wet deciduous shrub-sedge areas - summer resident
Song Sparrow[a,b]	- willows, particularly near streams and rivers - summer resident

APPENDIX IV

Vegetation Stand Tables

POPULUS TREMULOIDES CLOSED FOREST

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON WED AUG 17/83 11:29:08 PART 1 OF 1

THIS TABLE CONTAINS 57 SPECIES IN 6 PLOTS

VEGETATION PLOT NUMBER	MF82 003	MF82 008	MF82 009	MF82 021	MF82 024	MF82 025
PROJECT IDENTIFICATION	CAMH IL	CAMH IL	CAMH IL	CAMH IL	CAMH IL	CAMH IL
LEGAL	125 21W5	125 21W5	125 21W5	125 21W5	125 21W5	125 21W5
BIOGEOGRAPHICAL ZONE	BS	BS	BS	BS	BS	BS
IBP CODE						
VEGETATION TYPE						
LANDFORM						
ELEVATION (M)						
SLOPE (DEGREES)	03	20	25	10	00	05
ASPECT	S	E	SE	S	00	S
SOIL						
MOISTURE REGIME	3	3	3	3	3	3
DRAINAGE						
SITE POSITION						
STABILITY INDEX						
MICROTOPOGRAPHY						
ROCK	03	00	00	00	00	00
HUMUS	15	40	50	70	95	75
MINERAL SOIL	.5	00	00	00	00	00
DEAD FALL	04	10	15	10	05	05
WATER	00	00	00	00	00	00
TOTAL UNVEGETATED						
TREE CANOPY I	75	85	70	85	99	95
TREE CANOPY II						
SHRUB CANOPY I	15	05	10	15	00	20
SHRUB CANOPY II	30	70	15	30	10	35
HERB-DWARF SHRUB	43	35	30	25	15	30
BRYOID	14	.5	.5	03	10	.5

LAYER NUMBER 1: TREE CANOPY I 6 SPECIES RUN ON WED AUG 17/83 11:29:08 PART 1 OF 1

Betula papyrifera	--	--	--	--	--	20
Picea mariana	02	--	--	--	--	--
Pinus contorta	02	--	--	05	--	--
Populus balsamifera	--	--	--	--	--	04
Populus tremuloides	68	85	65	80	94	40
Salix scouleriana	03	--	05	--	05	31

LAYER NUMBER 3: SHRUB CANOPY I 6 SPECIES

VEGETATION PLOT NUMBER	MF82 003	MF82 008	MF82 009	MF82 021	MF82 024	MF82 025
Alnus crispa	--	--	05	05	--	20
Picea mariana	07	--	--	--	--	--
Populus tremuloides	02	05	05	--	--	--
Salix bebbiana	--	--	--	05	--	--
Salix glauca	06	--	--	--	--	--
Salix scouleriana	--	--	--	05	--	--

LAYER NUMBER 4: SHRUB CANOPY II 5 SPECIES

VEGETATION PLOT NUMBER	MF82 003	MF82 008	MF82 009	MF82 021	MF82 024	MF82 025
Alnus crispa	03	.5	07	--	--	35
Picea mariana	10	05	--	25	10	--
Populus tremuloides	--	05	--	--	--	--
Shepherdia canadensis	02	--	--	05	--	--
Viburnum edule	15	60	06	--	--	--

LAYER NUMBER 5: HERB-DWARF SHRUB 28 SPECIES

VEGETATION PLOT NUMBER	MF82 003	MF82 008	MF82 009	MF82 021	MF82 024	MF82 025
Actaea rubra	--	01	01	--	--	--
Agropyron trachycaulum	--	--	03	--	--	--
Alnus crispa	--	--	--	--	--	03
Aquilegia brevistyla	.5	--	--	--	--	--
Arctostaphylos uva-ursi	03	--	--	--	--	--
Betula papyrifera	--	--	--	02	--	.5
Carex praticola	--	--	--	--	.5	--
Cornus canadensis	05	06	05	05	02	02
Epilobium angustifolium	--	03	03	04	02	02
Equisetum sylvaticum	--	--	--	--	--	01
Lathyrus ochroleucus	--	--	--	--	.5	--
Linnaea borealis	08	05	03	03	02	15
Lycopodium annotinum	.5	--	--	--	--	--
Mertensia paniculata	02	02	02	02	--	02
Mitella nuda	--	.5	--	--	--	--
Oryzopsis pungens	--	--	--	03	01	--
Petasites palmatus	--	--	--	--	--	01
Picea mariana	--	05	--	--	02	.5
Populus balsamifera	.5	--	--	--	--	--
Populus tremuloides	.5	01	--	--	--	--
Pyrola asarifolia	.5	02	05	--	--	--
Pyrola secunda	01	02	02	01	.5	01
Ribes lacustre	--	--	.5	--	--	--
Ribes oxyacanthoides	--	.5	--	--	--	--
Rosa acicularis	01	--	--	--	--	--
Rosa woodsii	--	08	05	02	03	02
Rubus pubescens	--	.5	--	--	--	--
Vaccinium vitis-idaea	22	--	01	03	--	01

LAYER NUMBER 6: BRYOID 23 SPECIES RUN ON WED AUG 17/83 11:29:08 PART 1 OF 1

VEGETATION PLOT NUMBER	MF82 003	MF82 008	MF82 009	MF82 021	MF82 024	MF82 025
Aulacomnium palustre	--	--	--	--	.5	--
Bryum sp.	--	--	.5	--	--	--
Ceratodon purpureo	--	--	.5	--	--	--
Cetraria pinastre	--	--	.5	--	--	--
Cladonia cenotea	--	--	--	--	.5	--
Cladonia cornuta	.5	--	--	--	--	--
Cladonia cristata	.5	--	--	--	--	--
Cladonia deformis	--	--	--	--	.5	--
Cladonia gracilis	--	--	.5	--	.5	--
Cladonia mitis	02	--	--	--	--	--
Cladonia multiformis	--	--	--	--	.5	--
Cladonia rangiferina	05	--	--	--	--	--
Cladonia sp.	01	--	--	--	--	--
Dicranum fuscescens	--	--	--	--	.5	--
Drepanocladus uncinatus	--	--	.5	--	--	--
Hylocomium splendens	--	.5	--	--	05	--
Hypogymnia physodes	.5	--	--	--	--	.5
Parmelia sulcata	.5	--	--	--	--	--
Peltigera aphthosa	03	--	.5	--	--	--
Pleurozium schreberi	03	--	--	02	05	--
Pohlia nutans	--	--	--	--	.5	--
Polytrichum juniperinum	--	--	--	01	.5	--
Ptilidium pulcherrinum	--	--	--	--	.5	--

PINUS CONTORTA

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON WED AUG 17/83 13:47:50 PART 1 OF 1

THIS TABLE CONTAINS 49 SPECIES IN 4 PLOTS

VEGETATION PLOT NUMBER	MF82 010	MF82 014	MF82 017	MF82 030
PROJECT IDENTIFICATION	CAMH IL	CAMH IL	CAMH IL	CAMH IL
LEGAL	125 21W5	125 21W5	112 52W	125 21W5
BIOGEOGRAPHICAL ZONE	BS	BS	5B	BS
IBP CODE			S	
VEGETATION TYPE				
LANDFORM				
ELEVATION (M)				
SLOPE (DEGREES)	20	12	00	05
ASPECT	NW	N	00	W
SOIL				
MOISTURE REGIME	3	3	3	3
DRAINAGE				
SITE POSITION				
STABILITY INDEX				
MICROTOPOGRAPHY				
ROCK	00	00	00	00
HUMUS	05	08	15	15
MINERAL SOIL	00	00	03	00
DEAD FALL	05	10	02	15
WATER	00	00	00	00
TOTAL UNVEGETATED				
TREE CANOPY I	15	20	60	25
TREE CANOPY II				
SHRUB CANOPY I	35	15	15	35
SHRUB CANOPY II	35	55	10	35
HERB-DWARF SHRUB	30	25	65	60
BRYOID	55	25	25	20

LAYER NUMBER 1: TREE CANOPY I 3 SPECIES

Picea mariana	03	05	03	10
Pinus contorta	12	15	50	15
Populus tremuloides	--	--	07	--

LAYER NUMBER 3: SHRUB CANOPY I 7 SPECIES

VEGETATION PLOT NUMBER	MF82 010	MF82 014	MF82 017	MF82 030
Alnus crispa	--	--	--	08
Picea glauca	--	--	--	20
Picea mariana	27	08	10	--
Pinus contorta	--	07	--	--
Populus tremuloides	--	--	05	--
Salix bebbiana	03	--	--	07
[redacted]	05	[redacted]	[redacted]	[redacted]

University of Alberta

VEGETATION PLOT NUMBER	MF82 010	MF82 014	MF82 017	MF82 030
Betula glandulosa	15	03	--	--
Betula pumila	--	--	02	--
Ledum groenlandicum	17	45	02	--
Picea mariana	03	04	06	05
Salix glauca	--	03	--	--
Shepherdia canadensis	--	--	.5	--
Viburnum edule	--	--	--	30

LAYER NUMBER 5: HERB-DWARF SHRUB 20 SPECIES

VEGETATION PLOT NUMBER	MF82 010	MF82 014	MF82 017	MF82 030
Arctostaphylos uva-ursi	--	--	10	--
Cornus canadensis	04	04	04	01
Empetrum nigrum	03	--	02	--
Epilobium angustifolium	02	--	03	01
Equisetum arvense	.5	02	--	--
Equisetum scirpoides	--	02	--	01
Equisetum sylvaticum	--	02	--	--
Geocaulon lividum	02	--	--	--
Lathyrus ochroleucus	--	--	--	.5
Linnaea borealis	--	--	03	01
Lycopodium annotinum	02	01	--	--
Mertensia paniculata	--	--	--	.5
Oryzopsis pungens	--	--	04	.5
Pedicularis labradorica	.5	--	--	--
Picea mariana	--	--	05	--
Pyrola secunda	--	--	--	01
Rosa woodsii	01	05	02	02
Salix bebbiana	--	--	02	--
Vaccinium vitis-idaea	16	09	30	25
Viburnum edule	--	--	--	03

LAYER NUMBER 6: BRYOID 19 SPECIES

VEGETATION PLOT NUMBER	MF82 010	MF82 014	MF82 017	MF82 030
Cetraria nivalis	--	03	--	--
Cetraria pinastre	--	--	01	--
Cladonia cornuta	.5	--	--	--
Cladonia cristata	--	--	.5	--
Cladonia mitis	10	05	03	04
Cladonia rangiferina	--	--	02	--
Dicranum undulatum	.5	--	--	--
Drepanocladus uncinatus	--	--	.5	--
Hylocomium splendens	15	12	.5	13
Parmeliopsis ambigua	--	--	.5	--
Peltigera aphthosa	10	03	02	03
Peltigera malacea	.5	--	--	--
Pleurozium schreberi	20	--	--	--
Pohlia nutans	--	--	03	--
Polytrichum juniperinum	--	02	--	--
Polytrichum piliferum	--	--	.5	--
Polytrichum strictum	.5	--	--	--
Ptilidium ciliare	--	--	03	
Ptilium crista-castrensis			08	

PICEA MARIANA/ FEATHERMOSS

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON THU AUG 18/83 13:58:17 PART 1 OF 1

THIS TABLE CONTAINS 61 SPECIES IN 4 PLOTS

VEGETATION PLOT NUMBER	MF82 004	MF82 015	MF82 027	MF82 029
PROJECT IDENTIFICATION	CAMH IL	CAMH IL	CAMH IL	CAMH IL
LEGAL	125 21W5	125 21W5	125 21W5	125 21W5
BIOGEOGRAPHICAL ZONE	BS	BS	BS	BS
IBP CODE				
VEGETATION TYPE				
LANDFORM				
ELEVATION (M)				
SLOPE (DEGREES)	03	05	05	00
ASPECT	W	S	N	00
SOIL				
MOISTURE REGIME	4	4	4	3
DRAINAGE				
SITE POSITION				
STABILITY INDEX				
MICROTOPOGRAPHY				
ROCK	00	00	00	00
HUMUS	03	03	05	00
MINERAL SOIL	00	00	00	00
DEAD FALL	05	15	05	00
WATER	00	00	00	00
TOTAL UNVEGETATED				
TREE CANOPY I	20	50	70	50
TREE CANOPY II				
SHRUB CANOPY I	10	10	05	20
SHRUB CANOPY II	10	05	10	15
HERB-DWARF SHRUB	75	10	85	60
BRYOID	80	95	75	40
LAYER NUMBER 1: TREE CANOPY I			7 SPECIES	
Betula papyrifera	--	02	--	--
Picea complex	--	41	--	03
Picea glauca	--	--	--	15
Picea mariana	20	--	60	25
Populus balsamifera	--	--	--	01
Populus tremuloides	--	02	--	03
Salix scouleriana	--	05	10	03
TOTAL	20	50	70	50

LAYER NUMBER 3: SHRUB CANOPY I 6 SPECIES

RUN ON THU AUG 18/83 13:58:17 PART 1 OF 1

VEGETATION PLOT NUMBER	MF82 004	MF82 015	MF82 027	MF82 029
Alnus tenuifolia	--	02	--	--
Picea glauca	--	--	--	03
Picea mariana	10	05	05	05
Populus tremuloides	--	--	--	04
Salix bebbiana	--	03	--	--
Salix scouleriana	--	--	--	08

LAYER NUMBER 4: SHRUB CANOPY II 6 SPECIES

VEGETATION PLOT NUMBER	MF82 004	MF82 015	MF82 027	MF82 029
Betula pumila	--	--	--	03
Picea glauca	--	--	--	04
Picea mariana	10	05	10	03
Populus balsamifera	--	--	--	02
Potentilla fruticosa	--	--	--	03
Salix scouleriana	--	--	--	05

VEGETATION PLOT NUMBER	MF82 004	MF82 015	MF82 027	MF82 029
Agropyron trachycaulum	--	.5	--	--
Amelanchier alnifolia	--	--	--	.5
Arctagrostis arundinacea	--	--	10	--
Betula glandulosa	--	--	.5	--
Calamagrostis neglecta	--	--	02	01
Carex vaginata	--	--	--	.5
Cornus canadensis	--	01	02	03
Delphinium glaucum	--	--	--	05
Empetrum nigrum	--	--	.5	--
Epilobium angustifolium	--	.5	--	04
Equisetum sylvaticum	--	--	45	--
Galium boreale	--	.5	--	02
Geocaulon lividum	--	02	--	.5
Lathyrus ochroleucus	--	.5	--	--
Ledum groenlandicum	--	--	02	01
Ledum palustre	62	--	--	--
Linnaea borealis	--	01	--	03
Mertensia paniculata	--	.5	--	03
Mitella nuda	--	--	--	01
Moneses uniflora	--	--	--	.5
Oxycoccus microcarpus	.5	--	--	--
Petasites palmatus	--	--	--	01
Petasites sagittatus	--	--	.5	--
Picea glauca	--	--	--	05
Picea mariana	10	02	08	--
Populus tremuloides	--	--	--	02
Potentilla fruticosa	--	--	--	03
Pyrola asarifolia	--	--	--	03
Pyrola secunda	--	--	.5	--
Ribes glandulosum	--	--	03	--
Ribes lacustre	--	.5	--	--
Rosa woodsii	--	01	05	15
Rubus chamaemorus	03	--	06	--
Rubus pubescens	--	--	--	04
Vaccinium uliginosum	--	--	5	5
Vaccinium vitis-idaea	5	02	02	02
Viburnum edule	--	01	--	02

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VEGETATION PLOT NUMBER	MF82 004	MF82 015	MF82 027	MF82 029
Bryoria fuscescens	.5	--	--	--
Bryum sp.	.5	--	.5	--
Cladonia coccifera	01	--	--	--
Cladonia deformis	.5	--	--	--
Cladonia mitis	04	05	--	--
Drepanocladus exannulatus var. t	--	--	--	.5
Evernia mesomorpha	.5	--	--	--
Hylocomium splendens	05	80	41	40
Hypogymnia physodes	.5	--	.5	--
Parmelia sulcata	.5	--	--	--
Peltigera aphthosa	--	05	03	--
Pleurozium schreberi	70	05	10	--
Ptilidium ciliare	.5	--	--	--
Ptilium crista-castrensis	--	--	03	--
Sphagnum fimbriatum	--	--	15	--
Tomenthypnum nitens	--	--	03	--
Usnea subfloridana	--	--	.5	--

PICEA MARIANA/ LICHEN

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON WED AUG 17/83 11:39:49 PART 1 OF 1

THIS TABLE CONTAINS 39 SPECIES IN 3 PLOTS

VEGETATION PLOT NUMBER	MF82 006	MF82 018	MF82 019
PROJECT IDENTIFICATION	CAMH IL	CAMH IL	CAMH IL
LEGAL	125 21W5	125 21W5	125 21W5
BIOGEOGRAPHICAL ZONE	BS	BS	BS
IBP CODE			
VEGETATION TYPE			
LANDFORM			
ELEVATION (M)			
SLOPE (DEGREES)	00	00	14
ASPECT	00	00	NW
SOIL			
MOISTURE REGIME	4	3	3
DRAINAGE			
SITE POSITION			
STABILITY INDEX			
MICROTOPOGRAPHY			
ROCK	00	00	00
HUMUS	.5	05	05
MINERAL SOIL	00	00	00
DEAD FALL	10	03	10
WATER	00	00	00
TOTAL UNVEGETATED			
TREE CANOPY I	02	00	.5
TREE CANOPY II			
SHRUB CANOPY I	08	.5	20
SHRUB CANOPY II	05	10	25
HERB-DWARF SHRUB	75	75	90
BRYOID	25	60	19

LAYER NUMBER 1: TREE CANOPY I 1 SPECIES

Picea mariana	02	--	.5

LAYER NUMBER 3: SHRUB CANOPY I 1 SPECIES

VEGETATION PLOT NUMBER	MF82 006	MF82 018	MF82 019
Picea mariana	08	.5	20

LAYER NUMBER 4: SHRUB CANOPY II 5 SPECIES RUN ON WED AUG 17/83 11:39:49 PART 1 OF 1

VEGETATION PLOT NUMBER	MF82 006	MF82 018	MF82 019
Alnus crispa	--	--	02
Betula papyrifera	--	.5	--
Picea mariana	05	06	14
Pinus contorta	--	04	--
Salix glauca	--	--	09

LAYER NUMBER 5: HERB-DWARF SHRUB 18 SPECIES

VEGETATION PLOT NUMBER	MF82 006	MF82 018	MF82 019
Andromeda polifolia	--	04	--
Arctostaphylos rubra	--	--	03
Betula glandulosa	02	--	--
Carex gynocrates	--	--	.5
Empetrum nigrum	--	--	10
Equisetum scirpoides	--	--	03
Geocaulon lividum	--	02	--
Ledum groenlandicum	--	08	40
Ledum palustre	60	40	--
Oxycoccus microcarpus	--	01	.5
Pedicularis labradorica	--	--	.5
Picea mariana	04	05	10
Pinus contorta	--	02	--
Rosa woodsii	--	--	03
Rubus chamaemorus	04	06	--
Salix myrtillifolia	--	--	05
Vaccinium uliginosum	--	.5	10
Vaccinium vitis-idaea	05	07	06

LAYER NUMBER 6: BRYOID 18 SPECIES

VEGETATION PLOT NUMBER	MF82 006	MF82 018	MF82 019
Aulacomnium palustre	.5	--	--
Cetraria nivalis	02	.5	01
Cladonia amourocraea	.5	--	--
Cladonia coccifera	.5	--	01
Cladonia deformis	.5	--	03
Cladonia gracilis	03	--	--
Cladonia mitis	20	40	07
Cladonia rangiferina	.5	--	--
Cladonia sp.	--	05	02
Dicranum sp.	--	--	02
Dicranum undulatum	--	.5	--
Icmadophila ericetorum	.5	05	--
Mylia anomala	--	01	--
Peltigera aphthosa	--	--	03
Polytrichum strictum	.5	02	--
Sphagnum fuscum	--	07	--
Sphagnum sp.	--	--	.5
Sphagnum warnstorfii	5	--	-

PICEA MARIANA/ SPHAGNUM

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON WED AUG 17/83 12:27:06 PART 1 OF 1

THIS TABLE CONTAINS 17 SPECIES IN 1 PLOTS

VEGETATION PLOT NUMBER	MF82 001
PROJECT IDENTIFICATION	CAMH IL
LEGAL	125 21W5
BIOGEOGRAPHICAL ZONE	BS
IBP CODE	
VEGETATION TYPE	
LANDFORM	
ELEVATION (M)	
SLOPE (DEGREES)	02
ASPECT	S
SOIL	
MOISTURE REGIME	5
DRAINAGE	
SITE POSITION	
STABILITY INDEX	
MICROTOPOGRAPHY	
ROCK	00
HUMUS	10
MINERAL SOIL	00
DEAD FALL	05
WATER	00
TOTAL UNVEGETATED	
TREE CANOPY I	00
TREE CANOPY II	
SHRUB CANOPY I	15
SHRUB CANOPY II	25
HERB-DWARF SHRUB	40
BRYOID	40

LAYER NUMBER 3: SHRUB CANOPY I 2 SPECIES RUN ON WED AUG 17/83 12:27:06 PART 1 OF 1

Picea mariana	12
Salix glauca	03
TOTAL	15

LAYER NUMBER 4: SHRUB CANOPY II 2 SPECIES RUN ON WED AUG 17/83 12:27:06 PART 1 OF 1

VEGETATION PLOT NUMBER	MF82 001
Picea mariana	20
Salix glauca	05
TOTAL	25

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LAYER NUMBER 5: HERB-DWARF SHRUB 8 SPECIES

VEGETATION PLOT NUMBER	MF82 001
Andromeda polifolia	.5
Betula glandulosa	.5
Calamagrostis inexpansa	.5
Ledum palustre	35
Oxycoccus microcarpus	01
Rubus chamaemorus	02
Vaccinium uliginosum	.5
Vaccinium vitis-idaea	02

LAYER NUMBER 6: BRYOID 7 SPECIES

VEGETATION PLOT NUMBER	MF82 001
Aulacomnium palustre	.5
Cladonia deformis	04
Cladonia sp.	01
Pleurozium schreberi	.5
Polytrichum juniperinum	03
Sphagnum fuscum	30
Sphagnum warnstorfii	02

DECIDUOUS OPEN HEATH

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON WED AUG 17/83 12:30:11 PART 1 OF 1

THIS TABLE CONTAINS 39 SPECIES IN 2 PLOTS

VEGETATION PLOT NUMBER	MF82 007	MF82 031
PROJECT IDENTIFICATION	CAMH	CAMH
LEGAL	IL 125	IL 125
BIOGEOGRAPHICAL ZONE	21W5	21W5
IBP CODE	BS	BS
VEGETATION TYPE		
LANDFORM		
ELEVATION (M)		
SLOPE (DEGREES)	00	00
ASPECT	00	00
SOIL		
MOISTURE REGIME	6	5
DRAINAGE		
SITE POSITION		
STABILITY INDEX		
MICROTOPOGRAPHY		
ROCK	00	00
HUMUS	00	03
MINERAL SOIL	00	00
DEAD FALL	00	03
WATER	03	00
TOTAL UNVEGETATED		
TREE CANOPY I	05	08
TREE CANOPY II		
SHRUB CANOPY I	10	20
SHRUB CANOPY II	50	20
HERB-DWARF SHRUB	55	70
BRYOID	20	25

LAYER NUMBER 1: TREE CANOPY I 2 SPECIES

Larix laricina	--	05
Picea mariana	05	03

LAYER NUMBER 3: SHRUB CANOPY I 3 SPECIES

VEGETATION PLOT NUMBER	MF82 007	MF82 031
Larix laricina	02	--
Picea mariana	08	--
Salix planifolia	--	20

VEGETATION PLOT NUMBER	MF82 007	MF82 031
Betula pumila	--	02
Myrica gale	20	--
Picea mariana	10	04
Salix glauca	20	14

LAYER NUMBER 5: HERB-DWARF SHRUB 28 SPECIES

VEGETATION PLOT NUMBER	MF82 007	MF82 031
Achillea millefolium	--	02
Arctagrostis arundinacea	--	05
Betula glandulosa	20	--
Calamagrostis inexpansa	01	--
Carex aquatilis	05	20
Carex vaginata	--	01
Empetrum nigrum	--	.5
Equisetum arvense	--	01
Equisetum sylvaticum	--	03
Ledum groenlandicum	--	09
Ledum palustre	06	--
Linnaea borealis	--	01
Luzula multiflora	--	.5
Mertensia paniculata	--	01
Mitella nuda	--	02
Oxycoccus microcarpus	01	.5
Parnassia palustris	--	01
Pedicularis labradorica	.5	.5
Petasites palmatus	--	02
Pyrola asarifolia	01	--
Ribes glandulosum	--	.5
Rubus acaulis	01	01
Rubus chamaemorus	--	04
Salix myrtillifolia	--	15
Salix pedicellaris	20	--
Spiranthes romanzoffiana	.5	--
Vaccinium uliginosum	--	01
Vaccinium vitis-idaea	--	01
TOTAL	55	70

LAYER NUMBER 6: BRYOID 5 SPECIES

VEGETATION PLOT NUMBER	MF82 007	MF82 031
Hylocomium splendens	--	02
Plagiomnium ellipticum	--	.5
Sphagnum sp.	20	--
Sphagnum warnstorfii	--	15
[illegible]		

SEDGE FEN

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON THU AUG 18/83 14:34:38 PART 1 OF 1

THIS TABLE CONTAINS 49 SPECIES IN 5 PLOTS

VEGETATION PLOT NUMBER	MF82 011	MF82 032	MF82 023	MF82 028	MF82 033
PROJECT IDENTIFICATION	CAMH IL	CAMH IL	CAMH IL	CAMH IL	CAMH IL
LEGAL	125 21W5	125 21W5	125 21W5	125 21W5	125 21W5
BIOGEOGRAPHICAL ZONE	BS	BS	BS	BS	BS
IBP CODE					
VEGETATION TYPE					
LANDFORM					
ELEVATION (M)					
SLOPE (DEGREES)	00			00	
ASPECT	00			00	
SOIL					
MOISTURE REGIME	7	6	5	6	
DRAINAGE					
SITE POSITION		6	4		
STABILITY INDEX					
MICROTOPOGRAPHY		3	4		
ROCK	00			00	
HUMUS	00	08		00	05
MINERAL SOIL	01			00	
DEAD FALL	00		0	00	05
WATER	08	08	5	20	05
TOTAL UNVEGETATED					
TREE CANOPY I	00			00	
TREE CANOPY II					
SHRUB CANOPY I	00			00	
SHRUB CANOPY II	03		90	00	20
HERB-DWARF SHRUB	70	99	20	40	85
BRYOID	55			60	
LAYER NUMBER 4: SHRUB CANOPY II			4 SPECIES		
Betula glandulosa	--	--	--	--	04
Picea mariana	03	--	--	--	--
Salix planifolia	--	--	--	--	16
Salix pyrifolia	--	--	05	--	--

LAYER NUMBER 5: HERB-DWARF SHRUB 36 SPECIES

VEGETATION PLOT NUMBER	MF82 011	MF82 032	MF82 023	MF82 028	MF82 033
Agrostis scabra	--	--	--	--	05
Andromeda polifolia	01	01	--	--	--
Calamagrostis canadensis	--	--	--	05	--
Calamagrostis neglecta	--	--	--	--	05
Carex aquatilis	--	--	15	02	50
Carex brunnescens	--	--	03	--	01
Carex canescens	--	--	--	.5	--
Carex limosa	--	12	--	--	--
Carex paupercula	30	--	--	--	--
Carex rostrata	--	--	60	80	15
Chamaedaphne calyculata	30	04	--	--	--
Cicuta bulbifera	--	--	--	02	--
Drosera rotundifolia	01	.5	--	--	--
Epilobium angustifolium	--	--	--	--	.5
Epilobium palustre	--	--	.5	--	--
Equisetum arvense	--	--	.5	--	--
Equisetum sylvaticum	--	--	01	--	--
Eriophorum angustifolium	--	--	.5	--	--
Eriophorum brachyantherum	--	02	--	--	--
Eriophorum chamissonis	05	01	--	--	--
Galium labradoricum	--	--	--	03	--
Galium trifidum	--	--	02	--	--
Geum allepicum	--	--	--	--	02
Glyceria pulchella	--	--	07	--	--
Kalmia polifolia	--	.5	--	--	--
Oxycoccus microcarpus	01	.5	--	--	--
Parnassia palustris	--	--	--	--	02
Petasites sagittatus	--	--	.5	--	--
Potentilla norvegica	--	--	--	--	01
Potentilla palustris	--	--	05	07	03
Ranunculus sceleratus	--	--	.5	--	--
Rubus acaulis	--	--	--	--	01
Rubus chamaemorus	02	--	--	--	--
Salix pedicellaris	--	--	04	--	--
Scheuchzeria palustris	--	20	--	--	--
Scutellaria galericulata	--	--	02	--	--

LAYER NUMBER 6: BRYOID 9 SPECIES

VEGETATION PLOT NUMBER	MF82 011	MF82 032	MF82 023	MF82 028	MF82 033
Brachythecium nelsonii	--	--	.5	--	--
Cetraria nivalis	.5	--	--	--	--
Drepanocladus fluitans	--	--	--	14	--
Lophozia sp.	--	--	.5	--	--
Sphagnum angustifolium	--	--	.5	--	--
Sphagnum magellanicum	--	15	.5	--	--
Sphagnum majus	--	45	--	--	--
Sphagnum riparium	--	--	--	06	--
Sphagnum sp.	55	--	--	--	--

DECIDUOUS CLOSED SCRUB

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON WED AUG 17/83 12:37:47 PART 1 OF 1

THIS TABLE CONTAINS 29 SPECIES IN 2 PLOTS

VEGETATION PLOT NUMBER	MF82 020	MF82 026
PROJECT IDENTIFICATION	CAMH IL	CAMH IL
LEGAL	125 21W5	125 21W5
BIOGEOGRAPHICAL ZONE	BS	BS
IBP CODE		
VEGETATION TYPE		
LANDFORM		
ELEVATION (M)		
SLOPE (DEGREES)	00	00
ASPECT	00	00
SOIL		
MOISTURE REGIME	4	3
DRAINAGE		
SITE POSITION		
STABILITY INDEX		
MICROTOPOGRAPHY		
ROCK	00	00
HUMUS	55	20
MINERAL SOIL	00	00
DEAD FALL	05	05
WATER	00	00
TOTAL UNVEGETATED		
TREE CANOPY I	05	07
TREE CANOPY II		
SHRUB CANOPY I	80	85
SHRUB CANOPY II	20	15
HERB-DWARF SHRUB	20	60
BRYOID	25	20

LAYER NUMBER 1: TREE CANOPY I 3 SPECIES

Picea mariana	03	01
Populus balsamifera	--	02
Populus tremuloides	02	04

LAYER NUMBER 3: SHRUB CANOPY I 7 SPECIES

VEGETATION PLOT NUMBER	MF82 020	MF82 026
Alnus crispa	40	--
Alnus tenuifolia	--	25
Picea mariana	05	--
Populus tremuloides	05	--
Salix glauca	--	20
Salix planifolia	--	40
Salix scouleriana	30	--
TOTAL	80	85

LAYER NUMBER 4: SHRUB CANOPY II 5 SPECIES

VEGETATION PLOT NUMBER	MF82 020	MF82 026
Alnus crispa	10	--
Alnus tenuifolia	--	10
Picea mariana	05	--
Ribes glandulosum	--	05
Salix glauca	05	--

LAYER NUMBER 5: HERB-DWARF SHRUB 14 SPECIES

VEGETATION PLOT NUMBER	MF82 020	MF82 026
Arctostaphylos rubra	08	--
Calamagrostis canadensis	--	05
Cornus canadensis	--	05
Epilobium angustifolium	--	02
Equisetum scirpoides	01	01
Equisetum sylvaticum	.5	36
Erigeron acris	--	.5
Ledum groenlandicum	--	.5
Linnaea borealis	--	02
Mertensia paniculata	--	02
Picea mariana	--	03
Rubus pubescens	--	04
Senecio indecorus	--	.5
Vaccinium vitis-idaea	11	--

LAYER NUMBER 6: BRYOID 7 SPECIES

VEGETATION PLOT NUMBER	MF82 020	MF82 026
Aulacomnium palustre	08	.5
Brachythecium sp.	--	15
Cladonia gracilis	.5	--
Cladonia mitis	05	--
Hylocomium splendens	12	--
Hypogymnia physodes	--	.5
Rhium sp.	--	05

WATER

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON THU AUG 04/83 10:19:32 PART 1 OF 1

THIS TABLE CONTAINS 4 SPECIES IN 1 PLOTS

VEGETATION PLOT NUMBER	MF82
	022
PROJECT IDENTIFICATION	CAMH
	IL
LEGAL	125
	21W5
BIOGEOGRAPHICAL ZONE	BS
IBP CODE	
VEGETATION TYPE	
LANDFORM	
ELEVATION (M)	
SLOPE (DEGREES)	00
ASPECT	00
SOIL	
MOISTURE REGIME	7
DRAINAGE	
SITE POSITION	
STABILITY INDEX	
MICROTOPOGRAPHY	
ROCK	00
HUMUS	00
MINERAL SOIL	00
DEAD FALL	00
WATER	99
TOTAL UNVEGETATED	
TREE CANOPY I	00
TREE CANOPY II	
SHRUB CANOPY I	00
SHRUB CANOPY II	00
HERB-DWARF SHRUB	30
BRYOID	00

LAYER NUMBER 5: HERB-DWARF SHRUB 4 SPECIES RUN ON THU AUG 04/83 10:19:32 PART 1 OF 1

Nuphar variegatum	14
Polygonum amphibium	14
Potamogeton praelongus	02
Sparganium multipedunculatum	.5